

### NUCLEAR ENERGY INSTITUTE

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June 1, 2000

Mr. Christopher I. Grimes Chief, License Renewal and Standardization Branch Division of Regulatory Improvement Programs Office of Nuclear Reactor Regulation U.S. Nuclear Regulatory Commission Washington, DC 20006

SUBJECT: Generic Aging Lessons Learned Report Comments

### **PROJECT NUMBER: 690**

Dear Mr. Grimes:

Enclosed are comments on Chapter VII of the Generic Aging Lessons Learned (GALL) Report. Two documents are provided for each section of the chapter. One document is a pen-and-ink mark-up of the existing GALL pages to reflect our comments. Each comment is identified by number. The second document is a table containing our comments, numbered consistent with the marked-up pages.

As we mentioned in our previous cover letter, we continue to wrestle with the format incompatibility between that provided by your contractor and our software programs. For this reason, we are unable to provide the clean copy we had intended, but continue to explore alternatives to the formatting issue in hopes of providing clean copies in the near future.

We look forward to discussing the enclosed comments with the NRC staff. If you have any questions please call Bob Evans (202.739-8101), or me (202.739-8093).

Sincerely,

ibuglas /. Walters

Douglas J. Walters

C: Mr. Sam Lee Mr. P.T.Kuo

Enclosure



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# A3. Spent Fuel Pool Cooling and Cleanup (Pressurized Water Reactor)

A3.1 Piping

A3.1.1	Pipe,	Fittings	and	Flanges
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- A3.1.2 Studs and Nuts
- A3.2 Filter

A3.2.1 Studs and Nuts

A3.3 Strainer

A3.3.1 Studs and Nuts

A3.4 Check Valve

A3.4.1	Body and Bonnet

A3.4.2 Studs and Nuts

A3.5 Hand Valve

- A3.5.1 Body and Bonnet
- A3.5.2 Studs and Nuts
- A3.5.3 Linings
- A3.6 Heat Exchanger
  - A3.6.1 Shell
  - A3.6.2 Nozzles
  - A3.6.3 Studs and Nuts
- A3.7 Ion Exchanger
  - A3.7.1 Studs and Nuts
- A3.8 Pump
  - A3.8.1 Casing
  - A3.8.2 Studs and Nuts

## A3.9 Flow Orifice

A3.9.1 Studs and Nuts

A3.10 Spent Fuel Transfer Tube

A3.10.1 Studs and Nuts

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# A3. Spent Fuel Pool Cooling and Cleanup (Presentined Water Reactor)

# System, Structures, and Computents

The system, structures, and components included in this table comprise the pressurized water reactor (PWR) spent fuel storage. The PWR spent fuel storage contains stainless steel spent fuel storage racks and Boraflex sheets (if used) submerged in a chemically treated borated water. The intended function of the spent fuel rack is to separate spent fuel assemblies. Boraflex sheets fastened to the storage cells provide for neutron absorption and help maintain subcriticality of spent fuel assemblies in the spent fuel pool. Based on US Nuclear Regulatory Commission Regulatory Guide 1.26, "Guality Group Classifications and Standards for Water, Steam, and Radioactive-Waste-Containing Components of Nuclear Power Plants," all components in the spent fuel storage are classified as Group C Quality Standards.

### System Interfaces

No other systems contained in this report interfaces with the PWR spent fuel storage.

THIS DESCRIPTION AND THIS DESCRIPTION OF THE STREET AND THE WAY AN

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Item	Structure and	Region of	Motorial	Environ-	Aging	Aging	Deferences	
A3 1 1	Pining	Pine Fittings	Stainless	Chemically	Local Loss of	Pitting and	References	
1.0.1.1	, ibuie	and Flanges	Steel (SS)	Treated	Material	Crevice	1080 Edition	
		0		Borated		Corrosion	NRC IN 84-18.	
				Water		-	NRC IN 96-11.	
							NRC GL 88-05	
			•				EPRI TR-105714.	
							Specifications	All W9 - P
							opeenications.	
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A3. SPENT FUEL POOL COOLING AND CLEANUP (Pressurized Water Reactor)

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LIARY SYSTEMS AUX SPENT FUEL POOL COOMING AND CLEANUP (Pressurized Water Reactor) A3. Further Existing Evaluation Evaluation and Technical Basis Aging Management Program (AMP) onitoring The AMP relies on minimizing maintaining the water chemistry and inservice insp impurnies by monitoring and ISI) for managing the effects of pitting and crey maintaining the borated water corrosion on the intended function of the sn fuel pool chemistry in accordance with the guidelines of EPNI TR-105714 and cooling and cleanup system components (2) Preventive Actions: Monitoring and maintaining the system water memistry in accordance with the guidelines of EPRI TRimplemented by plant technical specifications, and intervice inspection 105714 helps to minimize in purities in the system fluid (ISI) is in conformance with ASME The AMP generally contains chemical parameter Section XI (edition specified in 10 CFI specifications, sampling frequency, analysis, and corrective action. Chemical parameters, such as 50.55a), Table IWD 2500-1, test and examination category D-C for sy ems concentrations of chloride, sulfate, oxygen, and in support of residual heat removal impurities are monitored and controlled. The preentive from spent fuel storage pool. VII A 3inadvertent introduction of impurities into the sys to unacceptable levels of contaminants in the exposure of the spent fuel pool free surface to airbor contaminants (IN 84-18), or from ingress of deminiralizer resins (IN 96-11). (3) Parameters Monitored/Inspected: The system water chemistry is monitored and controlled INSERTH SEE CHANTER to mitigate the effects of pitting and crevice corrosionion the intended function of the component. Examination category D. Of ASME Section XI Table IWD 2500-1 required visual VT-2 examination during system leaks hydrostatic test. (4) Detection of Aging Effects: Within WATER ISTRU me spent fuel pool cooling system the and stagnant flow conditions where impurities and/o corrosive chemicals may concentrate and cause creater and pitting corrosion. VT-2 examination of ASME Section XI, Table IWD 2500-1 will not detect pitting and crevice corrosion. Therefore, a one-time inspection of representative components and esceptible locations should be undertaken to ensure that significant corrosion is not occurring. Based on piping/component geometry and fluid flow conditions, susceptible locations can be identified. Follow up actions are based on the inspect results and plant technical specification. (5) Monitor and rending: The results of periodic monitoring of rated water chemistry provide data for trending. Th results of the one-thild inspection should be used to dictate future inspection. System leakage test is conducted pri to plant startup following each refueling outage a hydrostatic test at or near the end of each inspection interval. (6) Acceptance Criteria: The chemistry monitoring program provides specification of chemica parameters and acceptable levels. Any relevant conditions that may be detected during the leakage and hydrostati tests are evaluated in accordance with IWD-3000. (7) Corrective Actions: Plant borated water chemistry control program specifies the target values for the chemistry rs. Corrective actions are taken if the target parama are exceeded. Corrective actions of the above onetime inspection are based on the results of the insp Furthermore, IWA-5250 requires that the source leakage detected during the presence test should be locat and evaluated for corrective measures. Repair and replacement of in accordance with IWA-4000 and

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#### SPENT FUEL POOL COOLING AND CLEANUP (Pressurized Water Reactor) A3.



Aging Effect Aging Mechanism Region of Environ-Structure and References Component Interest Material ment Item Air, Leaking Loss of Chemically Materia Boric Acid NRC GL 88-05. Studs and A3.1.2 Piping CS, Low Alloy Material Corrosion Nuts Treated Steel (LAS) Borated Water 2

A3. SPENT FUEL POOL COOLING AND CLEANUP (Pressurized Water Reactor)

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AUXILLARY SISTEMS A3 SPENT FUEL POOL COOLING AND CLEANUP (Pressurized Water Reactor)

Existing		Further
Aging Management Program (AMP)	Evaluation and Technical Basis	Dianation
	(centiound of pranticur provide	
	(6) Acceptance Criteria: The chemistry monitoring	
	program provides specification of chemical parameters	
	and acceptable levels. Any detected SCC should be	
	evaluated in accordance IWC-3400 and IWC-3514. (7)	
	Corrective Actions: Plant bounded water chemistry control	
	program specifies the target values for the chemistry	
	parameters. Corrective actions are taken if the target	1 1
	values are exercised. Corrective actions of the above one	
	time inspection are based on the results of the inspection.	
-	Furthermore, IWA-5250 requires that the source of	
	leakage detected during the pressure test should be located	
	and evaluated for corrective measures. Repair and	
	replacement is in accordance with IWA-4000 and IWB-	
	4000, and reexamination in accordance with IWA-2200.	
	(88,9) Confirmation Process, and Administrative	
	Controls: Site corrective actions program, QA procedures,	
	site review and approved process, and administrative	
	controls are implemented in accordance with Appendix B	
	to 10 CFR Part 50 requirements and will continue to be	1
	adequate for license renewal. (10) Operating Experience:	
	NRC information Notice (IN) 97-19 indicated that several	
	Wough-weil cracks at siging welds have found in	i.
	spent fuel coaling system. SuC has also been foundar	<b>h</b>
	webs in som other systems containing be net water.	
	The program focuses on managing	Nó
n response to NRC Generic Letter (GL)	(1) Scope of the state of the s	
8-05 to manage loss of material due to	stori and low allow steel components. The focus i on	<b>}</b>
general corrosion, pitting and crevice	Steel and low anoy steel components. The tempical	/
corrosion on carbon steel and low alloy	Small leaks which generally occur but a generational leakage.	
stee components as a result of borated	Specification minits for operational demogra	
water leaks, the AMP includes: (1)	2) Prepentive Actions. Periodic aspection and surface during	
dentify the examination locations	any bonc acid residue from event the occurrence of boric	
where poric acid leaks could occur.	system walkdown help topicyclin all occurrential locations of	E
including insulated components and	acto corrosion. Inclusion of the potential to prevent	
inaccessible areas. The focus is on	akage and the path of leaking acid also helps to protont	1
small leaks which generally occur	borated acto corrosion. (5) Full uncertains	<pre></pre>
below technical specification limits for	Monitorea/hispectea, file film pulloting view	
operational leakage. (2) Establish the	spection for discoloration of insulation are. Visual	
path of the Making boric acid and the	residue which are signs or born effective method for	
components to ensure that leaks of	inspection, such as v1-2, is an encentre method to	
boric acid are promptly identified and	identification of discoloration and borte acid reader of the	
corrected. (3) Ferform visual inspection	or more boils/studes the leak are removed and examined	
at least once at each refueling outage to	code edition close to the leak are religion of Aging	
identify and quantify any leakage at	for evidence of boric acid wastances belection of Aging	
specific locations and to remove any	Effects: The AMP estangentes the path of the leaking bolic	
boric acid residue that is found. VT-2	acid and the components to ensure that leaks of bolic acid	
visual examination is generally used to	are promptly dentified and corrected before there is a loss	<u>.</u>
detect evidence of leaks such as	of the interfaced function of the component. (5) monitor has	al
discoloration and boric add residue. (4)	Trending: The visual inspection is an enective metho	<u> </u>
Investigate any leakage that is found	for relecting signs of corte water reasons. (6) Accontant	
and locate leak source and areas of	inspection provides data for trending. (6) Acception	
corrosion. Evaluate the affected	Griteria: No discoloration of bonc acid respect found on	i 🖌
components for continued service by	surfaces of components, insulation or moor areas that	1 <b>X</b>
engineering analysis. Corrective	may indicate borated water takage. No leakage of non-	
actions include repair or replacement of	f contacted and insulated components. (7) Corrective	1
the affected components and correction	Actions: Source of leakage should be located and	
of any equipment deficiencies that	evaluated for corrective measures. (8 & 9) Confirmation	
cause the leaks.	Process, and Administrative Controls: Site corrective	il and the second se
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• <b>↓</b> " / ▲ /		
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VΠ AUXILIARY SYSTEMS

Structure and Region of Environ-Aging Aging Item Interest Component Material ment Effect Mechanism References A3.2.1 Filter Studs and CS. LAS Air, Leaking Loss of Boric Acid NRC GL 88-05. Nuts Chemically Material Corrosion Treated Borated Water A3.3.1 Strainer Studs and CS, LAS Air, Leaking Loss of Boric Acid NRC GL 88-05. Nuts Chemically Material Corrosion Treated Borated Water A3.4.1 Check Valve Body and Local Loss SS. Chemically Pitting and ASME Section XI, of Bonnet CS with SS Treated Material Crevice 1389 Edition. Cladding Borated NRC4N 84-18. Corrosion, Water . NRC N 96-11. NRC GL 88-05. ERI TR-105714. Plant Technical Specifications. A 3 z  $\mathbf{V}$ 

SPENT FUEL POOL COOLING AND CLEANUP (Pressurized Water Reactor) A3.

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#### AUXILIARI SISTEMS

A3. SPENT FUEL POO	L COOLING AND CLEANUP (FIESSIFIZED WATCH Reactor)	Further
Existing	(AMP) Evaluation and Technical Basis	Evaluation
Aging management regram	from preducts page)	
	actions program. QA procedures, site review and approval	
	process, and administrative controls are implemented in	
	accordance with Appendix B to 10 CFR part 50	
	requirements and will continue to be adequate for replacement	
	of the affected components and correction of any	
	equipment deficiencies that cause the leaks.	
	(10) Operating Experience: Leakage of borated water from	
	bolton joints or seals has frequently caused severe	
	Concord and the stude and fostepers	
	such as poils, studs, and lasteriers.	No
Same as for Boric Acid Corrosio	ts study and nuts.	
Item AS. 1.2 pipting states that had		
Same as for Boric Acid Corrosio	on of Same as for Boric Acid Corrosion of Item A3.1.2 piping	No
Item A3.1.2 piping studs and nut	ts. studs and nuts.	
The AMP relies on minimizing	Ter scope of Program: The plogram relies on preventing	Yes,
impurities by monitoring and	measures and inservice inspection (ISI) to manage the	Contract of
maintaining the borated water	effects of pitting and crevice corrosion on the intended	
chemistry in accordance with th	he function of components. (2) recontinue activity.	-
guidelines of EPRI TR-105714 at	in accordance with the guidelines of EPRI TR-105714 held	
specifications, and inservice in	spection to minimize impurities in the system fluid. Chemical	1 W J V A
(ISI) is in conformance with AS	ME parameters, such as concentrations of chloride, sulfate,	1 2 2 6 1
Section XI (edition specified in 1	10 CFR oxygen, and impurities are monitored and controller. In	10.00.90
50.55a), Table IWD 2500-1, test	and preventive actions, nowever, are considered materiality	
examination category D-C for s	avai aveten due to unaccestable levels of contaminants in the	■ ジンノン
in support of residual field fem	Noric acid, exposure of the spent fuel pool free surface to	ーちびえみ
from spent fuer storage poor	alloorne contaminants (IN 84-18), or from ingress of	
111 A3-6	demineralizer resins (IN 96-11). (3) Parameters	26-4 61
V''' - 44	Monitored/Inspected: The AMP monitore chemisty	11441
TISERTH	system water leakage. Inspection requirements of ASME	1 1 2 2 2
	Section XI, Table IWD 25001, category D-C specify isual	1 SON!
KEE CHAN	VT-2 (IWA-5240) examination during system leakage and	14 701
WE - TO TH	Androstatic test of all pressure retaining Class 3	
HII FOIL	full for the second second of Aging Effects; within the	4 NZ N
Oni MARIA	stagdam flow conditions where impurities and/or	16211
plumin ma	consister chemicals may concentrate and cause crewce	N N N N
Allenisi	nd nitting corrosion_VT-2 examination of ASME Section	➡ ひくいつ
CHI	XI Table IWD 2500-1 will not detect pitting and create	- アンショ
(InOGILAW)	corrosion. Therefore, a one-time inspection of	
VIIII )	representative components and asceptible locations	
	is not occurring. This inspection may be visual if the	N' Nr
1	valve is disastembled, and may be covered by the plant	· · · ·
	maintenance program. UT thickness measurements col	
1	also be used. Follow up actions are based on the inspection	""  <b>[</b>
	Tesults and plant technical specification. (5) monttor sig	
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Item	Structure and Component	Region of Interest	Material	Environ-	Aging Effect	Aging	References
Item	Component	Interest	Material	ment	Effect	Mechanism	References
A3.4.1. A3.4.2	Check Valve	Body & Bonnet (external surfaces),	Body: CS with SS lining;	Air, Leaking Chemically Treated	Loss of Material	Boric Acid Corrosion	NRC GL 88-05.
A3.5.1	Hand Valve	Studs and Nuts Body and Bonnet	Studs/Nuts: CS or LAS SS, CS with SS cladding	Borated Water Chemically Treated Borated Water	Local Loss of Material	Pitting and Creviet Convosion	ACME Section VI, NRC IN 84-18. NRC IN 96-11. NRC GL 88-05. EPRI TR 105714. Plant Technical Specifications.
A3.5.1, A3.5.2	Hand Valve	Body and Bonnet (external surfaces), Studs and Nuts	Body: CS with SS cladding: Studs/Nuts: CS or LAS	Air, Leaking Chemically Treated Borated Water	Loss of Material	Boric Acid Corrosi n	NFC GL 88-05.

A3. SPENT FUEL POOL COOLING AND CLEANIP (Pressurized Water Reactor)

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### A2 SPENT FUEL POOL COOLING AND CLEANUP (Pressurized Water Reactor)

- AD. SPEAT FUEL FOOL COUL		Further
Existing Aging Management Program (AMP)	Evaluation and Technical Basis	Evaluation
Same as for Boric Acid Corrosion of Item A3.1.2 piping studs and nuts.	and Trending: The results of periodic monitoring of borated water chemistry provide data for trending the results of the one-time inspection should be used to dictate future inspection. System leakage test is conducted prior to plant startup following each refuging outage, and hydrostatic test at or near the grad of each inspection interval. (6) Acceptance Cateria: The chemistry monitoring program neovides specification of chemical parameters and acceptable levels. Any relevant conditions that may be detected during the leakage and hydrostatic tests are evaluated in accordance with acceptance standards of IWD-3000 for Class 3 components. If Constring Area bearted water chemistry control program specifies the target values for the chemistry parameters. Corrective actions of the inspection. IWA-5250 requires that the source of leakage detected during the pressure test should be located and evaluated for corrective measures. Repair and replacement are in ageordance with IWA-4000 and IWA- 7000. (8 & 9) Conjumation Process and Administrative Controls: Site QA procedures, review and approval proceeds, and administrative controls are implemented incoordance with requirements of Appendix B to 10 cm. Part 50 and will continue to be adequate for the period of license renewal. (10) Operating Experience: Localized corrosion is likely to occur at crue the geometry where buildup of impurities can ecur. The potential exists for introduction of imputies into the system as contaminant in the boric acid or introduced through the free sumace of spent fuel pool (IN 84-18), or from ingress of contaminant in the boric acid or introduced through the free sumace of spent fuel pool (IN 84-18), or from ingress of contaminant in the boric acid or introduced through the free sumace of spent fuel pool (IN 84-18), or from ingress of contaminant in the boric acid or introduced through the free sumace of spent fuel pool (IN 84-18), or from ingress of contaminant in the boric acid or introduced through the free sumace of spent fuel pool (IN 84	Νο
Same as for Pitting and Crevice Corrosion of Items A3.4.1 body and bonnet of check valve.	Same as for Pitting and Crevice Corrosion of Items A3.4.1 body and bonnet of check valve.	Vergers Ebensons af se dissected in the function of the circle and the second
Same as for Boric Acid Corrosion of Item A3.1.2 piping studs and nuts.	Same as for Boric Acid Corrosion of Item A3.1.2 piping studs and nuts.	NO

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				Environ	Adina	Ading	
Item	Structure and Component	Region of Interest	Material	ment	Effect	Mechanism	References
A3.5.3	Hand Valve	Linings	Elastomers	Chemically	Hardening,	Rubber	-
				Treated	Cracking	Degrada-	
				Borated		tion,	
				water		-	
			·				
					2		
A3.61	Heat	Shell	CS	Chemine lin	Loss of	Pitting and	Sector 18.
1	Exchanger			Teateur	Material	Crevice	1000 Edition
	Ĵ			Desateur		Corrosion,	EPRITR-105714.
1						Corrosion	Specifications.
				Chamically		Corrosion	Opecifications.
				Treated De-			
			7	mineralized			
1				Water on the	$\mathbf{T}$		
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A3. SPENT FUEL POOL COOLING AND CLEANUP (Pressurized Water Reactor)

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AUXILIARY SYSTEMS SPENT FUEL POOL COOLING AND CLEANUP (Pressurized Water Reactor) VII Further A3. Existing Evaluation Evaluation and Technical Basis Aging Management Program (AMP) An inspection program should be implemented to manage Yes. Long-term exposure of the rubber the effects of rubber degradation on the intended function no existing linings to borated water can result in of the component. The program should include sampling AMP rubber degradation such as, welling, criteria, inspection method, inspection frequency, hardening and cracking which, in turn, acceptance criteria, and corrective action. Plant specific can cause corrosion of the underlying aging management program is to be evaluated. carbon steel surfaces. No existing aging management program. (1) Scope of Program - The program relies on monitoring Yes. The AMP relies on minimizing and maintaining reactor coolant and cooling water Ele imporities by monitoring and chemistry and inservice inspection (ISI) for many the maintaining reactor coolant and effects of pitting and crevice corrosion on the intended cooling water chemistry implemented function of the component. (2) Preventine Actions: by plant technical specifications, and Monitoring and maintaining the chalistry conditions of inservice inspection (ISI) in reactor coolant and cooling water will minimize the conformance with SME Section XI inpurities in the system fluit. The preventive actions. (edition specified in 10°CFR 50.55a), however, are considered inadequate because of Table IWD 2500-1, test and examination inadvertent introduction of impurities into the system. category D-C for systems in support of Also, high concentration of impurities at locations having residual heat removal from spent fuel stagnant flow could cause pitting and crevice corrosion. (3) Parameters Monitored/Inspected: The parameters storage pool. monitored in the borated water are provided in the VII AUTER INSERT #9 SEE CHANTER #11 FOR #11 FOR cifications based on EPRI guidelines. The parameters tout dissolved iron, dissolved copper, chlorice dissolved oxygen, suspended solids, pH, and hydrazi Examination category D-C of ASME Section XI le IWD 2500-1 requires visual VT-2 examination during system leakage test and system hydrostatic test to detect the leakage. (4) Detection of Aging Effects: Within the spent fuel pool cooling system, there are regions of low and stagnant flow conditions where impurities and/or corrosive chemicals may concentrate and cause pitting and crevice corrosion. Visual examination VT-2 required by IWD 2500-1 and not detect pitting and crevice corrosion. Therefore, a one-time inspection of representative components and susceptible locations nd be undertaken to ensure that significant corrosion the counting Based on philig/component geometry and fluid flow conditions, susceptible locations can identified. Follow up actions are based on inspection results and plant technical specification. and Trending: The results of periodic monitoring of borated water chemistry provide tata for trending. The results of the one-time inspection should be used to dictate future inspection. System leakage test is conducted prior to plant startup following each refueling outage, and hydrostatic ten at or near the end of each inspection interval 16 inceptance Criteria: The chemistry monitoring program provides specification of chemical meters and acceptable levels Any relevant that may be detected during the leakage and hydro tests are evaluated in accordance with accordance standards of IWD-3000 for Class 3 miponents. (7) Corrective Actions: Plant berated water chemistry control program specifies the target values for the chemistry parameters. Corrective actions are taken if the target values are exceeded. Corrective actions of the above one-time inspection are based on the results of the

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### A3 SPENT FUEL POOL COOLING AND CLEANUP (Pressurized Water Reactor)

	A3. SPENT FUEL POOL COOLIN	GAND CLEANOF (FICSSMILLE MELL	Further	
ſ	Existing	Evaluation and Technical Basis	Evaluation	
	Aging Management Program (AMI)	and the second s		
		inspection. IWA-5250 requires that the source of lealenge		
		detected during the pressure test should be located and		
		evaluated for corrective measures. Repair and		
		replacement of the corrosive damager components are in		
		accordance with IWA-4000 and WA-7000. (8 & 9)		
		Confirmation Process, that Administrative controls. One		
		approval process, and administrative controls are		
		implemented in accordance with Appendix B to 10 CFR		
	-	50-conditions and will continue to be adequate		
		license renewal. (10) Operating Experience: Localized		
		corrosion can occur at crevices that are not exposed to the		
		general flow stream or there stagnant flow conditions,		
•		the shell the of heat exchanger exposed to the chemically		
		The star side of ficar cachinger appoint of the		
	C. Duris Asid Comparison of	Same as for Boric Acid Corrosion of Item A3.1.2 piping	No	
	Same as for Bonc Acta Corroston of	stude and nute.		
	Item A.S. 1.2 pipting status to the rates.			
			1	
	Same as for Boric Acid Corrosion of	Same as for Boric Acid Corrosion of Item A3.1.2 piping	NO	
	Item A3.1.2 piping studs and nuts.	studs and nuts.		
		(1) Score of Program: The program relies on preventive	Yes,	6.6
/	The AMP relies on monitoring and	masures and inservice inspection (ISI) and inservice	Character 4	
	mantaining water chemistry based on	testing (IST) to manage the effects of pitting corresion,	alumit to a	ps ul
	implemented by plant technical	crevice corrosion, and cavitation erosion on the intended	San Street	
-	specifications, inservice inspection in	function of the components. (2) Preventise Actions:		- L 71
/	conformance with ASME Section XI	Monitoring and maintaining system water chemistry		
	(edition specified in 10 CFR 50.55a),	here's minimizing impurities in the system fluid. The		7.4
	Table IWD 2500-1, test and examination	AMP generally contains chamical parameter		3 N 1 /
	category D-C, and based on the testing	specifications, sampling nequency, maryon, and		NIN N
_	requirements of 10 CFR 50.55a for	concentration of chloride, sulfate, oxygen, and		2 121V
•	ASME Code Class 3 parities, and	impurities are monitored and controlled in accordance	N S	1. 1. 21
•	Generic Letter 89-04, inservice testing	with mant's technical specification. In some case, the		642
	performed in accordance with ASME	prentive actions may be considered inadequate because		K 10
	Subsection IWP (or Operation and	of inadvertent introduction of impurities into the system	I <u>G</u>	N. 7. 1.
	Maintenance Code Subsection ITB) for	due la unacceptable levels of contaminants in the cont	N N	1.1.11
	pumps, or other approved program in	acia, exposure of the spent rule poor nee supret to		AR
1	the plant specifications.	demineralizer resins (IN 96-11) (STParameters		1211
F	1.1.13-2	Monitored/Inspected: The MP monitors the effects of		
F	VIAVE	corrosion and cavitation erosion by ISI to detect leakage		NN X
	-107 #9	and ST to evaluate component performance. Inspection	5	A DIA
	TNJER	requirements of ASME Section XI. Table IWD 2500-1,		X X Z
	LIFE MANTER	category D-C specify visual V1-2 (IWA-5240) examination		
	(JER CAR PRIMARY	Anni, system leakage and hydrostatic tests. (1) -0		1. 5 AV
1	I II FOIL - min	Astein, there are regions of low and stagnant flow		こらに
, f	LATER AFFERION	conditions where impurities and/or convisive chemicals		A 1.V
Į.	WAILE	may concentrate and cause pitting and crevice corrosion.		AIM
	DITEMPLEMIN L	Visual examination VT-2 unuired by IWD 2500-1 will not		111. 14
				N
			L )	N 1
				NA
		VII A3–17 DRAFT	- 12/06/99	
	And a state of the			

	S. SPEATFO			Densis	A	Ading	
Item	Structure and Component	Region of Interest	Material	Environ- ment	Effect	Mechanism	References
							:
·							
A3.8.1.	Pump	Casing	Casing: CS	Air, Leaking	Loss of Material	Boric Acid Corrosion	NRC GL 88-05.
A3.8.2		(external surface),	cladding;	Treated			
		Studs and Nuts	Studs/Nuts: CS, LAS	Borated Water		·	
A.3.9.1	Flow Orifice	Studs and	CS, LAS	Air, Leaking	Loss of	Boric Acid	NRC GL 88-05.
		Nuts		Treated	Material		
				Borated Water			
A3	Spent Fuel	Studs and	CS, LAS	Air, Leaking	Loss of	Boric Acid	NRC GL 88-05.
10.1	Transfer Tube	Nuts		Chemically	Material	Corrosion	
				Borated			
1			1	Water			1

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### A3. SPENT FUEL POOL COOLING AND CLEANUP (Pressurized Water Reactor)

The Grant Full Ford Cool		Further
Existing Aging Management Program (AMP)	Evaluation and Technical Basis	Evaluation
verie management veries (and)	looptinued from proving page	
	detect pitting corrosion, crevice corrosion, and cavitation	
	erosion. Therefore, a one-time inspection of	
	representative components and susceptible logitions	
	should be undertaken to ensure that significant corrosion	
	is not occurring. This inspection can be visual when the	
	pump is disassembled, and may be covered by the plant	
	maintenance program; UT theckness measurements may	
	also be included. Follow up actions are based on the	
	results of the one-time inspection. (5) Monitoring and	
	Trending: The esults of periodic monitoring of borated	
	water chemistry provide data for trending. The results of	
	the enertime inspection should be used to dictate future	
	in the state leskage test is conducted prior to plant	
	startup following each refueling outage, and hydrostatic	
	test at or near the end of each inspection interval	1 1
	(6) Acceptance Criteria: The chemistry monitoring	
	program provides specification of chemical parameters	1
	and acceptable levels. Any relevant conditions that may	
	be detected during the leakage and hydrostatic tests are	
	evaluated in accordance with IWD-3000 for Class 3	
	components. (7) Corrective Actions: Plant borated water	
	chemistry control program specifies the target values for	
	the chemistry parameters. Corrective actions are taken if	1 1
	the second states are exceeded. Confective actions of the	
	above one-time inspection are based on the results of the	
	inspection. IWA-5250 requires that the source reakage	
	detected during the pressure test should be located and	
	evaluated for corrective measures. Repair and	
	replacement are in accordance with IWA-4000 and IWA-	
	7000. (8 & 9) Confirmation Process and Administrative	
	Controls: Site OA procedures, review and approval	
	processes, and administrative controls are implemented	
	in accordance with requirements of Appendix B to 10 CFR	
	P 100 and will continue to be adequate for the period of	
	license renewal. 10) Operating Experience: Localization	
	corrosion is likely to occur at flange connections and	1
	crevices where buildup of impurities can comm. Also, the	1
	potential exists for introduction of impurities into the	
	system as contaminants in the boric acid or introduced	
	through the free entrace of spent fuel pool (IN 84-18), or	1
	from increases of demineralizer resins (IN 96-11).	
Same as for Boric Acid Corrosion of	Same as for Boric Acid Corrosion of Item A3.1.2 piping	No
Item A3.1.2 niping studs and nuts.	studs and nuts.	
The second provide a second se		
1		
Same as for Boric Acid Corrosion of	Same as for Boric Acid Corrosion of Item A3.1.2 piping	No
Item A3 1 2 nining shids and nuts	studs and nuts.	
Item mar. 2 pipen stans war inner		
Come on for Paris Anid Correction of	Same as for Boric Acid Corrosion of Item A3.1.2 piping	No
Same as for bone Actil Conoson of	stude and nuts.	
tem A3.1.2 pipung stuas and rads.		1
1		and the second se

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## GALL REPORT-MECHANICAL DISCIPLINE COMMENTS SECTION VIIA.3

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GALL	TITLE	ITEM NO.	PAGE	REVIEWER	COMMENT/ RESOLUTION
SECTION					
VII A3-1	Spent Fuel Cooling	A3	VII A3-3		Description of system, structures and components is for Spent Fuel
	and Cleanup				Storage and not Spent Fuel Cooling and Cleanup. Revise
					accordingly. Same comment for System Interfaces.
VII A3-2	Spent Fuel Cooling	A3.1.1	VII A3-4		Use of Chemistry will preclude loss of material due to corrosion in
	and Cleanup	A3.4.1	thru		the Spent fuel Pool Cooling and Cleanup System.
		A3.5.1	VII A3-7		
		A3.6.1			Reference to ASME Section XI, Tech Specs, OM Code and GL 89-
		A3.8.1	VII A3-9		04 should be deleted from the References column, the Existing
			thru		AMP column, and the Evaluation and Technical Basis column.
			VII A3-17		The AMA should only be the "Primary Water Chemistry Program."
					Refer to the proposed program description.
			VII A3-19		
					Hence, further evaluation is not warranted.
VII A3-3	Spent Fuel Cooling	A3.1.1	VII A3-6		For Carbon Steel material delete entire Section. There are no spent
	and Cleanup				fuel systems that use carbon steel piping with borated water.
VII A3-4	Spent Fuel Cooling	A3.1.1	VII A3-6		For SS material and Stress Corrosion Cracking delete entire section.
	and Cleanup				Stainless steels that operate at temperature $<140^{\circ}$ F are not usually
				1	subjected to SCC even in the presence of halogens, sulfates and
					oxygen. Spent Fuel Cooling systems usually operate at <140°F.
VII A3-5	Spent Fuel Cooling	A3.1.2	Various		Refer to AMA titled, "Boric Acid Corrosion Program" in lieu of
	and Cleanup	A3.2.1			existing program description.
		A3.3.1			
		A3.4.1			Refer to the proposed program description.
		A3.4.2			
		A3.5.1			
		A3.5.2			
		A3.6.1 thru			
		A3.6.3			
		A3.7.1			
		A3.8.1			
		A3.8.2			
		A3.9.1			
		A3.10.1			

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## GALL REPORT-MECHANICAL DISCIPLINE COMMENTS SECTION VIIA.3

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GALL SECTION	TITLE	ITEM NO.	PAGE	REVIEWER	COMMENT/ RESOLUTION
VII A3-6	Spent Fuel Cooling and Cleanup	A3.4.1	VII A3-10		Item appears to be limited to internal surfaces of clad carbon steel check valves exposed to borated water. Under Aging Mechanisms, delete general corrosion, since stainless steel cladding surfaces are not subjected to general corrosion. The external surfaces of this valve are evaluated in Item A3.4.2
VII A3-7	Spent Fuel Cooling and Cleanup	A3.6.1	VII A3-14		Under Environment delete chemically treated borated water. The carbon steel components of subject heat exchangers are subjected only to chemically treated demineralized water.
VII A3-8	Spent Fuel Cooling and Cleanup	A3.8.1	VII A3-16		Delete cavitation erosion under Aging Mechanisms. Pump design/application standards should preclude the occurrence of this mechanism. In any event if it were to occur, it would be fast acting, easily detectable because of the noise generated, and would result in reduced performance.

### A4. Spent Fuel Pool Cooling and Cleanup (Boiling Water Reactor)

A4.1 Piping

A4.1.1 Pipe, Fittings and Flanges

A4.2 Valves

A4.2.1 Body and Bonnet

A4.3 Heat Exchanger

A4.3.1 Shell

A4.4 Pump

A4.4.1 Casing

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A4. Spent Fuel Pool Cooling and Cleanup (Boiling Water Reactor) System, Structures, and Composents VIIA44-1

The system, structures, and components included in this table comprise the BWR spent fuel pool cooling and cleanup system and consist of piping, valves, heat exchanger, and pump. The system contains chemically treated oxygenated water. The system removes heat from the spent fuel pool, and transfers the heat to the closed cycle cooling water system, which in turn transfers the heat to the open cycle cooling water system. Based on US Nuclear Regulatory Guide 1.26, "Guality Group Classifications and Standards for Water, Steam, and Radioactive-Waste-Containing Components of Nuclear Power Plants," all components in the BWR spent fuel pool cooling and cleanup system are classified as Group C Quality Standards.

Pumps and valves are considered to be active components and pump internals and seats, discs, bolting, and other valve items should be covered by the plant maintenance program.

### System Interfaces

The system that interfaces with the BWR spent fuel cooling and cleanup system is the closed cycle cooling water system (Table VII C2).

VII	AUXILIARY SYSTEMS A4. SPENT FUEL POOL COOLING AND CLEANUP (Boiling Water Reactor)									
	Structure and	Region of		Environ-	Aging	Aging				
Item	Component	Interest	Material	ment	Effect	Mechanism	References	J		
A4.1.1	Piping	Pipe, Fittings, and Flanges	Stainless Steel (SS)	Oxygenated Water at Tempera- ture up to 51°C (125°F)	Loss of Material	Pitting and Crevice Corlosi	NUREG-0313, Rev. 2. Plant Technical Specifications. EPRI-103515	) -z		
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A4. SPENT FUEL POOL COOLING AND CLEANUP (Boiling Water Reactor)

AUXILIARY SYST

MS

Further Existing Evaluation Evaluation and Technical Basis Aging Management Program (AMP) DScope of Program: The AMD relies op monitoring on The AMP relies on minimizing maintaining the chemistry of the oxygenated water and impulities by monitoring and maintaining the oxygenated water ASME Section XI inservice inspection (ISI) for managing the effects of pitting and crevice corrosion on intended chemistry in accordance with the function of the component. (2) Preventive Actions: guidelines of NIREG 0313, Rev. 2 and Monitoring and maintaining the system water chemistry EPRI guidelines and implemented by coordance with the guidelines of NUREG 0313. Rev. 2 plant technical specifications, and and SPRI guidelines specified in TR-103515 to minimize inservice inspection (NI) in the impurities in the system fluid. Parameters directly, conformance with ASME Section XI related to corrosion, such as concentrations of chlorid sulfate, pxygen, and impurities are monitored and (edition specified in 10 CFR 60.55a), Table IWD 2500-1, test and e mination controllid. [3] Parameters Monitored/Inspected: AS category D-C for systems in support of Section 37, Table IWD 2500-1, examination category I residual heat removal from spent hel es visual VT-2 examination during system leak storage pool. t and system hydrostatic test to detect the leaks (4) Defection of Aging Effects: Pitting and crevice corrosion may occur at locations having stagnant conditions, where impurities in oxygenated water n av Table concentrate. VT-2 examination of ASMP Section XI IWD 2500-1 will not detect pitting and crevice corrosid Therefore, an one time inspection of representative components and susceptible locations should be undertaken to ensure that significant corrosion is n occurring. Based priping/component geometry and fluid INSERT flow conditions susceptible locations can be identified. Follow up actions are based on the inspection results plant technical specification. (5) Monitoring and Trending: Results of water chemistry monitoring prov da for trending. The results of one time inspection. should be used to dictate the future inspection. System leakage test is conducted prior to plant startup, following each refueling outage and hydrostatic test at or near th end of each. (6) Acceptance Criteria: The chemistry monitoring program provides chemical parameter AHEMMISTIC PROGIZIAN specification and acceptable levels. Any relevant conditions that may be detected during the leakage and hydrostatic tests are staluated in accordance with IWD-3000. (7) Corrective Actions: Plant chemistry control program specifies the acceptable values for chemistry parameters if the specified values are exceeded, correct actions are taken to bring back the chemistry parameters to specified levels. Corrective actions of the above one time ections are based on the results of the inspection. 1177-5250 requires that the source of leakage detected during the pressure test should be located and evaluated for corrective measures. Repair and replacement are in accordance with IWA-4000 and IWA-7000. 78 & 9) Confirmation Process and Administrative Controls: Site corrective actions program, GA procedures, site review and approval process, and administrative controls are implemented in accordance with Appendix B to 10 CFR Part 50 requipements and will continue to be adequate for license repewal. (10) Operating Experience Pitting and crevice Corrosion may occur at locations having stagnant conditions, where impurities in oxygenated water may concentrate.

	H. Greatire	ELTOOL COOL		mor count	, Matci Meacto	*)		
Item	Structure and Component	Region of Interest	Material	Environ- ment	Aging Effect	Aging Mechanism	References	
A4.1.1	Piping	Pipe, Fittings, and Flanges	Stainless Steel (SS)	Oxygenated Water at Tempera- ture up to 51°C (125°F)	Crack Initiation and Growth	Stress Corrosion Cracking	ASME Section XI, 1989 Edition. NUREC-0313. Rev. 2. Plant Technical Specifications. EPRI-103515	
A4.2.1	Valves	Body and Bonnet	SS. CS with SS Cladding: CS or LAS	Oxygenated Water at Tempera- ture up to 51°C (125°F)	Loss of Material	Pitting and Crevice Corrosion	ASME Section VI 1000 Editions and NUREG 0313, Rev. 2. Plant Technical Specifications. EPRI TR-103515	and the second second
							11A4-	2
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SPENT FUEL POOL COOLING AND CLEANUP (Boiling Water Reactor)

A4. Further Existing Evaluation Aging Management Program (AMP) Evaluation and Technical Basis Same as for Pitting and Crevice Corrosion of Item A.4.1.1 Yes. Same as for Pitting and Crevice Element 4 Corrosion of Item A.4.1.1 Piping. Piping. should be further evaluated scope of rrogram: The program renes on pre-Yes, The AMP relies on minimizing measures and inservice inspection (ISI) to manage t impurities by monitoring and effects of pitting and crevice corrosion on the component. maintaining the oxygenated water Preventive Actions: Chemical parameters, such as chemistry in accordance with the centrations of chloride, sulfate, oxygen, and guidelines of NUREG 0313, Rev. 2 and impurities are monitored and controlled in accordance EPRI guidelines and implemented by with the guidelines of NUREG-2013 and EPRI guidelines plant technical specifications, and specified in TR-103515. (3) Parameters Monitored/ inservice inspection (ISI) in Inspected: The AMP monitors the effects of corrosion by conformance with ASME Section XI ISI to detect system leakage. Inspection requirements of (edition specified in 10 CFR 50.55a). ASME Section M. Table IWD 2500-1, category D-C specify Table IWD 2500-1, test and examination T-2/IWA-5240) examination during system category D-C for systems in support of zisual 🗸 est and hydrostatic test of all pressure retaining residual heat removal from spent fuel 3 components. (4) Detection of Aging Effects: Pitting storage pool. decorrection may occur at locations, bavin stagnant flow conditions, where impurities in oxygenatic water may concentrate. VT-2 examination of ASME Section/XI, Table IWD 2500-1 will not determiniting an crevice corrosion. Therefore, an one time inspection of representative valves and susceptible locations should l undertaken to ensure that significant corrosion is not turring. This inspection may be visual if the valve is disassembled. UT thickness measurements could also be used. Follow up actions are based on the inspection results and plant technical specification. (5) Monitoring and Trending. Results of water chemistry monitoring provid data for trending. The results of one time inspection ould be used to dictate the future inspection. System leakage test is conducted prior to plant startup following each refueling outage, and hydrostatic test at or near the end of each inspection interval. (6) Acceptance Friteria: The chemistry monitoring program provides chemical parameter specification and acceptable levels. Any relevant conditions that may be detected during the leakage and hydrostatic tests are evaluated in accordance with acceptance standards of IWD-3000 for Class 3 components. (7) Corrective Actions: Plant chemistry control program specifies the acceptable values for chemistry parameters. If the specified values are exceeded corrective actions are taken to bring back the chemistry parameters to specified levels. Corrective actions of the e one time inspections are based on the results of t inspection. IWA-5250 requires that the source of leakage detected during the pressure test should be located and evaluated for corrective measures. Repair and replacement are in accordance with IWA-4000 and IWA-7000. (8 & 9) Confirmation Process and Administrative Controls Site GA procedures. review and approval processes, and administrative controls are implemented in accordance with requirements of Appendix B to 10 CFR

#### VII

Item         Component         Interest         Material         ment         Effect         Mechanism         References           A4.3.1         Heat         Shell         CS         Oxygenated         Material         Corrosion         1989 Editional           A4.3.1         Heat         Exchanger         Shell         CS         Oxygenated         Material         Corrosion         1989 Editional           Sile         City         Sile         CS         Oxygenated         Material         Corrosion         1989 Editional           Sile         City         Sile         Corrosion         EPRI TR-103515         Section SL           Interest         Material         Sile         Sile         Section SL         Section SL           Sile         Sile         Sile         Sile         Sile         Section SL         Section SL           Sile         Sile         Sile         Sile         Sile         Sile         Section SL           Sile         Sile         Sile         Sile         Sile         Sile         Sile           Sile         Sile         Sile         Sile         Sile         Sile         Sile           Sile         Sile         Sile		Structure and	Region of		Environ-	Aging	Aging	
A4.3.1 Heat Shell CS Oxygenated Material Corrosion. Part Technical SI*C (125*F) Shell CS Oxygenated Material Corrosion. Part Technical SI*C (125*F) Shell Corrosion. SPERITR-103515	Item	Component	Interest	Material	ment	Effect	Mechanism	References
A4.3.1 Heat Exchanger Shell CS Orygenated Loss of Material Pempera- hure up to S1°C (123°F) Corrosion. Pitting S1°C Corrosion. Pitting Corrosion. Pitting Corrosion. Pitting S1°C Corrosion. Pitting S1°C Corrosion. Pitting S								
A4.3.1 Heat Exchanger Shell CS Oxygenated Material Corrosion. Pitting and Crevice Corrosion. 1287 Edition. Pitting and Crevice Corrosion. 1257F) C Corrosion. EPRI TR-103515								
A4.3.1 Heat Exchanger Shell CS Oxygenated Exchanger Shell CS Oxygenated Material Corrosion. Pitting protocols (125°F) Shell CS Oxygenated Material Corrosion. Pitting Specifications. Dervice Corrosion. EPRI TR-103515								
A4.3.1 Heat Exchanger Shell CS Dorgenated Water at Tempera- thre up to S1(25%) Corrosion. Plant Technical Specifications. EPRITR-103315 DPRITR-103315							-	
Exchanger Water at Tempera- hare up to 51°C (125°F) Water at Corrosion. Plant Technical Specifications. EPRI TR-103515	A4.3.1	Heat	Shell	CS	Oxygenated	Loss of	General	ASME Section XI,
Imperation     and and Specifications.       51°C     Corresion.       (125°F)     Corresion.		Exchanger			Water at	Material	Corrosion.	1989 Edition.
SI'C Crevice Corrosion.					Tempera-		and	Specifications.
(125°F) Corrosion.					51°C		Crevice	EPRI TR-103515
			-		(125°F)		Corrosion,	
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# AUXILIARY SYSTEMS A4 SPENT FUEL POOL COOLING AND CLEANUP (Boiling Water Reactor)

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VΠ AUXILIARY SYSTEMS

A4. SPENT FUEL POOL COOLING AND CLEANUP (Boiling Water Reactor)

Further Existing Aging Management Program (AMP) Evaluation and Technical Basis Evaluation man page Part 50 and will continue to be adequate for this period of license renewal. (10) Operating Experience: Localized corrosion is likely to occur at crevice geometry where ...... of impurities can occur. (1) Coope of Program. The program The AMP relies on minimizing 65 COLOS CHIMIN and maintaining the chemistry conditions of the syste Element 4 impurities by monitoring and maintaining the system water chemistry implemented by plant water, for managing the effects of pitting and crevie should be corrosion on the intended function of the component. ther technical specifications, and inservice (2) Preventive Actions: Monitoring and maintaining the aluated inspection (ISI) is in conformance with -ASME Section XX (edition specified in 10 system water chemistry in accordance with the guidelines oNUREG 0313, Rev. 2 and FPRI guidelines specified in TR-CFR 50.55a), Table WD 2500-1, test and examination category D-C for systems in support of residual heat removal from spent fuel storage pool. 103515 minimize the impurities in the system fluid. Parameters directly related to corrosion, such as concentrations of chloride, sulfate, oxygen, and impurities are monitored and controlled. (3) Parameters VII A4.2. INSERTHQ tored/Finsposted The parameters monitored in dissolved iron, dissolved copper, chlorides, dissol en, suspended solids, pH, and hydrazine. Dissolved iron and copper are parameters directly related to corresion. Examination category -B of ASME Section XI Table IWD 2500-1 requires usual VT-2 examination during system leakage test and system hydrostatic test to detect the leakager However, high concentration of inpurities at locations having stagnant flow could cause pitting and crevice corrosion. (4) Detection of Aging can detect and identify the leakage, but can not detect pitting and crevice corrosion. Therefore, inspection at susceptible locations should be undertaken to ensure that significant corrosion is not occurring ..., Monitoring and Trending: The frequency of monitoring system water chemistry ranges from several times per week to once a SEE CHASTER # 11. FOR THE PRIMATEN WATER OHEMISTRU month. The results of monitoring should provide data for trending. (6) Acceptance Criteria: The chemistry monitoring program provides chemical parameter speciation and acceptable levels. Any significant dation is reported and requires further evaluation (7) Corrective Actions: The AMP contains chemica parameter specifications, sampling frequency malvsis and corrective actions. If the specified values are exceeded, corrective actions are initiated to bring back the chemistry parameters to specified levels. (8 & 9) Confirmation Processer and Administrative Controls: Site corrective actions program, QA procedures, site review and approval process, and administrative controls are implemented in accordance with Appendix B to 10 CFR 50 requirements and will contin license renewal. (10) Operating Experience: Convision and pitting can occur at the crevices that are not exposed to the general flow stream or under stagnmin flow conditions, such as at the tubesheet-shell joint, and other crevices in the shell side of heat en hanger.

	Structure and	Region of	1	Environ-	Aging	Aging		
em	Component	Interest	Material	ment	Effect	Mechanis	References	
1.4.1	Pump	Casing	SS, CS with SS Cladding	Oxygenated Water at Temperatur e up to 51°C (125°F)	Loss of Material	Pitting and Grevice Corrosion	North Section XI North Section XI North Section NUREG- 0313 Rev. 2. NRC GL 89-04. Plant Technical Specifications. EPRI TR-103515	
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AUXILIARY SYSTEMS A4. SPENT FUEL PC

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### SPENT FUEL POOL COOLDIG AND CLEANUP (Boiling Water Reactor)

Further Existing Evaluation Evaluation and Technical Basis Aging Management Program (AMP) L Scope of Program The program Telles on pro Yes. The applicable AMP relies on minimizing impurities by monitoring measures and inservice inspection (ISI) and inservic Sectore 1 midde testing (IST) to manage the effects of pitting and a vice and maintaining water chemistry corrosion on the component. (2) Preventive Actions: conditions in accordance with the guidelines of NUREG- 0313. Rev. 2, and Monitoring and maintaining the system water chemistry in accordance with EPRI guidelines to minimize EPRI guidelines and implemented by the impurities in the system fluid. The AMP generally plant technical specifications and contains chemical parameter specifications, sampling inservice inspection in conformance frequency, analysis, and corrective actions. Chemical with ASME Section XI (edition specified parameters, such as concentrations of chloride, sulfate, in 10 CFR 50.55a), Table IWD 2500-1, oxygen, and impunities are monitored and controlled test and examination category D-C, and (3) Parameter's Monitored/ Inspected: The AMP monitors based on the testing requirements of 10 the effects of corrosion by ISI to detect system water CFR 50.55a for ASME Code Class 3 pumps, and additional NRC staff leakage and IST to evaluate component performance. pection requirements of SME Section XI, Table Tw guidelines of NRC Generic Letter 89-04. 1. category D-C specify visual VT-2 (IWA-5240) inservice testing performed in examination during system leakage and hydrostatic test accordance with ASME Subsection IWP of all pressure retaining Class 3 components: Based on the (or Operation and Maintenance Code requirements of 10 CFR 50.55a for ASME Code Class 1, 2, Subsection ISTB) for pumps, or other and 3 pumps and guidelines of NDC Generic Letter (GL) 89approved program in the plant 04, IST is performed in accordance with ASME Subsection specifications. IWP (or OM Code Subsection ISTB). (4) Detection of Aring Effects: Pitting and crevice corrosion may occur at ocations having stagnant flow conditions, where impurities in oxygenated water may concentrate. VT-2 examination of Table IWD 2500-1 will not detect pittin crevice corrosion. Therefore, an one time inspection representative valves and susceptible locations sho be undertaken to ensure that significant corrosion occurring. This inspection may be visual if the alve is disassembled. UT thickness measurements could also used. Follow up actions are based on the inspection resu and plant technical specification, 46) Monitoring and Trending: Results of water, chemistry monitoring provides data for trending. The results of one time inspection should be used to dictate the future inspection System leakage est is conducted prior to plant startup following each refueling outage, and hydrostatic test at near the end of each inspection interval. (6) Acceptance right the chemistry monitoring program provides chemical parameter specification and acceptable leve Any relevant conditions that may be detected during the leakage and hydrostatic tests are evaluated in accordance with IWD-3000 for Class 3 components."(7) Corrective Actions: :Plant chemistry control program specifies the acceptable values for chemistry parameters. Corrective actions are taken when specified values are exceeded. IWA-5250 requires that the source of leakage detected during the pressure test should be located and evaluated for corrective measures. Repair and replacement are in Mance with IWA-4000 and IWA-7000. (8 & 9) ation Process and Adathistrative Control QA procedures, review and approval processes administrative controls are implemented in accordance with requirements of Appendix B to 10 CFR Part 50 and will continue to be adequate for the period of license renewal. (10) Operating Experience: Localized corrosion is likely to occur at lange connections and crevices where buildup of impurities can occur.

### GALL REPORT – MECHANICAL DISCIPLINE COMMENTS SECTION VIIA.4

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GALL SECTION	TITLE	ITEM NO.	PAGE	REVIEWER	COMMENT
VII A4-1	SFPC (BWR)	All			This SYSTEM is not in scope for all BWRs
VII A4-2		A4.1.1 A4.2.1 A4.3.1 A4.4.1	VII A4-5 Thru VII A4-11		Use of Chemistry will preclude loss of material due to corrosion in the Spent fuel Pool Cooling and Cleanup System. Reference to ASME Section XI, Tech Specs, OM Code and GL 89- 04 should be deleted from the References column, the Existing AMP column, and the Evaluation and Technical Basis column. The AMA should only be the " <i>Primary Water Chemistry Program</i> ." Refer to the proposed program description. Hence, further evaluation is not warranted.

### C1. Open Cycle Cooling Water System (Service Water system)

C1.1 Piping

- Cl.1.1 Piping and Fittings
- C1.1.2 Underground Piping and Fittings
- C1.2 Valves
  - C1.2.1 Body and Bonnet
- C1.3 Heat Exchanger
  - Ċ1.3.1 Shell
  - C1.3.2 Channel
  - C1.3.3 Channel Head
  - C1.3.4 Tube Sheets
  - C1.3.5 Tubes

C1.4 Flow Orifice

C1.4.1 Body

C1.5 Pump

C1.5.1 Casing

C1.6 Basket Strainer

C1.6.1 Body

VII C1-2

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# C1. Open Cycle Cooling Water System (Service Water System)

#### System, Structures, and Components

The system, structures, and components included in this table comprise the open cycle cooling water system which consists of piping, valves, heat exchangers, pumps, flow orifices, and basket strainers. The system contains raw untreated salt or fresh water. The system removes heat from the closed cycle cooling water system and, in some plants, other auxiliary systems and components such as steam turbine bearing oil coolers, or miscellaneous coolers in the condensate system. The heat is absorbed by the ultimate heat sink such as a cooling pond, cooling tower, river, lake, or sea. This table only addresses the heat exchangers for removing heat from the closed cycle cooling system; heat exchangers for removing heat from the closed cycle cooling system; heat exchangers for removing heat from the closed cycle cooling system; heat exchangers for removing heat stable VIII A for steam turbine bearing oil coolers and Table VIII E for condensate system coolers. Based on US Nuclear Regulatory Commission Regulatory Guide 1.26, "Quality Group Classifications and Standards for Water, Steam, and Radioactive-Waste-Containing Components of Nuclear Power Plants," all components in the open cycle cooling water system are classified as Group C Quality Standards.

Pumps and valves are considered to be active components and pump internals and seats, discs, bolting, and other valve items should be covered by the plant maintenance program.

### System Interfaces

The systems that interface with the open cycle cooling water system include the closed cycle cooling water system (Table VII C2), ultimate heat sink (Table VII C3), and other miscellaneous auxiliary systems and components.

VII	AUXILIARY SYS C1. OPEN CY	TEMS CLE COOLING W	ATER SYSTEI	M (Service Wa	iter System)	-	$\sqrt{C^2}$	$\mathbf{i}$
Item	Structure and Component	Region of Interest	Material	Environ- ment	Aging Effect	Aging	References	
Item C1.1.1	Component Piping	Interest Piping and Fittings (with or without Internal Lining or Coating)	Material Brass, Copper- Nickel, Carbon Steel (for fresh water only)	ment Raw, Untreated Salt Water or Fresh Water	Effect Loss o Material	General, Micro- biologicalli -Induced, Pitting, and Crevice Corrosion.	References	3

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AUXILIARY SYSTEMS C1. OPEN CYCLE COOLING WATER SYSTEM (Service Water System)

Existing Ing Management Program (AMP)

The AMP relies on preventive actions by selection of corrosion resistant materials, design with corrosion allowince or provision of corrosion resistant interior lining or coating, and inservice inspection (ISI) in conformatice with ASME Section XI (edition specified in 10 CFR 50.55a), Table IWD 2000-1, test and examination category D-B ar Class 3 pressure retaining components. In addition, GL 89-13 requires that a program must be implemented and maintained for surveillance and coatrol of flow blockage as a result of biofouling. It also requires that the heat thensfer capability be verified for all safetyrelated heat exchangers coold by service water system.

VII CI.

INSER 12 FOR & (SEE CHAN (1) Scope of Program: The 4MP relies on relaction of corrosion resistant materials, corrosion allowance or corrosion resistant lining or coating, and ASME Section XI inservice inspection (ISI) for managing the flects of corrosion on the intended function of the component. The AMP also relies on the proper implementation of GL 89-13. (2) Preventive Actions: The component is constructed of corrosion resistant materials such as red brass, coppernickel, AL6XN, or titatium. Lining or coating prevents corrosion by protecting the underlying metal surfaces from being exposed to corrosive environment, and unprotection piping, e.g., carbon steel used for fresh water systems, are designed with a corrosion allowance. Also, an active biofouling program is the place for surveillence and control of flow blockage. (3) Parameters Monitored/Inspected: ASME Section XI, Table IWD 2500-L exteriory D-B remuires visual VT-2 examination during

Evaluation and Technical Basis

1, category D-B requires visual VT-2 examination during system leakage and hydrostatic test to detect leakage. The biofouling program implemented in accordance to GL 89-13 provides surveillance for flow blockage and verification of the heat transfer capability for all safetyrelated heat exchangers soled by service water system. (4) Detection of Aging Effects: Concentration of sulfates and chlorides in sait water can cause pitting and corrosion under crevice conditions such as gasket surfaces, joints, and under Solt heads. Also, systems that use untreated vater are susceptible to microbiologically-induced MT 3 commation during system leakage and pressure tests will not detect these forms of corrogion. Therefore, a one-time inspection of representative components and susceptible locations including buried piping should be undertaken to ensure that significant corrosion is not occurring. Based on piping or component geometry, fluid flow conditions, lowest design margin, and time of service, susceptible locations can be identified. Follow up actions are based on the inspection results and plant technical specification. (5) Monitoring and Trending: The results of one time inspection should be used to dictate future inspection. System leakage test is conducted prior to plant startup following each refueling stage and hydrostatic test at or near the end of each inspection interval. (6) Acceptance Citteria: Any te conditions that may be detected during the leakage ar hydrostatic tests are evaluated in accordance wit 3000. (7) Corrective Actions: Corrective action of the above one-time inspection are based on the results of the inspection. IWA-5250 requires that the source of leakage detected during the pressure test should be located and evaluated for corrective measures. Repair and replacement are in accordance with IWA-4000 and IWA-7000. (8 & 9) Configmation Process and Administrative Controls: Site actions program, QA procedures. site review and approval process, and administrative control are implemented in accordance with Appendix B CFR Part 50

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#### VII

# AUXILIARY SYSTEMS C1. OPEN CYCLE COOLING WATER SYSTEM (Service Water System)

Item	Structure and	Region of	Material	Environ-	Aging Effect	Aging Mechanism	References
Item	Component	merese	material				
C1.1.1	Piping	Piping and	Brass,	Raw,	Buildup of	Biofouling	NRC GL 89-13.
		(with or without Internal Lining or Coating)	Nickel. Carbon Steel (for fresh water only)	Salt Water or Fresh Water	Deposit		и <b>не 1</b> , 54 об.
C1.1.2	Piping	Underground Piping and Fittings (External Surface)	Carbon Steel, Cast Iron (with Organic Coating or Wrapping)	Soil	Loss of Material	General, Galvanic, Micro- biologically -Influenced, Pitting, and Crevice Corrosion	NRC IN 94-03.

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AUXILIARY SYSTEMS

OPEN CYCLE COOLING WATER SYSTEM (Service Water System)





### AUXILIARY SYSTEMS

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AUXILIARY SYSTEMS VII

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C1.	OPEN CYCLE COOLING W	ATER SYSTEM (Service Water System)	
Aging Man	Existing agement Program (AMP)	Evaluation and Technical Basis	F ation
		(Continued from previous page)	
		requirements and will continue to be adequate for license	
		renewal (10) Operating Experience: Pitting and crevice	
		corresion may occur at locations having stagnant flor	
		conditions, where impurities in raw and fresh water	
		conditions, where informates in raw and nesh wate	
		concentrate. The VRC performed service water sy	
		operational performance inspection and the rest value	
		been discussed in NRC information Notice (if 7 03.	
in response to	C Generic Letter (GL)	(1) Scope of Program: The program is focur,	No
89-13, indust	r olemented	managing the aging effects of biofouling state intended	
surveillance a	ind trol program to	functions of the component. The AMP	
manage flow !	block problems in	proper implementation of GL 89-13.	
open-cycle ser	vice we system due to	Actions: Annual water sampling a state catment of biocide	
biofouling, sil	t, mud. corrosion	should reduce the level of macro mainism activities. (3)	
products. The	e program stally	Parameters Monitored/Inspection The biofouling program	
includes: (1) S	Sampling the	implemented in accordance 1998-13 requires	1
annually to d	etermine if the ogical	verification of the heat transfer capability for all safety-	
species have r	opulated the way urce.	related heat exchanges of the by service water system. The	
The system sh	hould be chlorinate	AMP also inspects sensitive portions of the piping and	
treated by bio	cide when the potent	components for bioformation (4) Detection of Aging Effects:	
biological sper	cies exists. (2) inspect.	Visual inspection state detect buildup of deposit due to	
a regular basi	s, sensitive portions of th	efouling. (5) Mon and and Trending: Periodic	
piping and co	mponents for biofoming:	pection moust rovide timely detection of the effects of	
(3) remove and	d clean excessive	(6)/ ceptance Criteria: Any significant	
accumulation	of biofouling products:	dentation to eported and requires further evaluation.	
and (4) monit	oring heat exchanger	7-9 rease Actions, Confirmation Process, and	
performance.	GL 89-13 requires that	Administrative Controls: Site corrective actions program,	
program must	be implemented and	QA process, site review and approval process, and	
maintained fe	r\surveillano and	admitted in accordance	
control of flow	blockene as a result of	with open to 10 QFR Part 50 requirements and will	
hiofouling	sovrequires that the heat	creating to be state for license renewal. (10) Operating	
transfer capal	bility be verified for all	perience: Example flow blockage by clams has caused	
safety-related	heat exchangers cooled by	ant shutdown. WRC performed service water system	
service water	system.	operational perform inspection and the results have	
	-	been discussed in NR empirication Notice (IN) 94-03.	
The external s	surfaces of the	(1)Scope of Program: ) togram relies on preventive	Yes.
underground	piping and fittings	measures such as coating, pping, and cathodic	Elementer
protected, per	standard indust	protection, for the the state of corrosion on the	the state
practice, with	external coating and	intended function of undergro, up up ng. (2) Preventive	stand (FOC
wrapping, and	a cathodic pretection	Actions Per industry practice a second piping is	
system. Other	suitable man hs may be	coated with protect be wat he was tar or synthetic	and have
used to monit	or the correction of	coating, and is an or serve in protection aper or plastic	
anderground	piping.	during initial for in-protection in parts from	You
		contacting which aggressive soil invironment. A cathoole	11
		protection system may these used to mis corrosion	DL FC
	/ becinc	by counteracting envanic activity. If method are than	FIAN >
I ani		coating and standic protection are used, these hous	
	Tat ' 🖌	must be described.(3) Parameters Monitored/ Instanted:	
		The effectiveness of the coatings and cathodic protection	<b>-</b>
	$\sim$	system, per industry standard practice, is determined	
		measuring coating conductance, by pipe-to-soil potent	$\sim$
	u. Ph. F	surveys, and by conducting bell hole examinations to	
	meni	visually examine the condition of the coating.	
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OM	, , , , , , , , , , , , , , , , , , , ,		
OM	P1-4		
Dem 1111	CI-4		
VII	CI-4		
VII	CI-4		

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#### AUXILIARY SYSTEMS VΠ

	Structure and	Region of		Environ-	Aging	Aging	
Item	Component	Interest	Material	ment	Effect	Mechanism	n References
		•		4			
C1.2.1	Valves (Check, Hand,	Body and Bonnet	Bronze, Stainless	Raw, Untreated	Loss of Material	General, Micro-	Honore States
	& Control Valves)	(with or without Internal Lining or Coating)	Steel, Carbon Steel (for fresh water only)	Salt Water or Fresh Water		biologically -Induced, Pitting, and Crevice Corrosion.	NRC IN 94-03. Plant Technical Specifications. GL 89-13.

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AUXILIARY SYSTEMS

Existing	Evaluation and Technical Basis	Evaluatio
Aging Management Program (AMP)	Continued from previous page	
	Coating and wiabount, nowever, can degrade with the	
	and corrosion may occur. Also, cathodic protection	
	requires periodic monitoring and main mance to ensure	
	that it is functioning properly the AMP should include	
	inspection of a sample of the buried piping to ensure that	
	coating and wrapping the intact and corrosion is	
	adequately manager. Also, a most spin infinite lance	
	program stolling be implemented to the first of Ading	
	Effect of increase in comme onductance or the	
	inditation that certain presions of the piping are not	
	ac matchy mit of a dicates evating degradation	
	In pection of a service of the buried pipe and confirmation	
	that the paint or coating think is an effective method to	
	ensure that sorrosion in external surfaces of the pipe has	
	not occurred and the intended functions are maintained.	
	(5) Monitoring chai irrenuing: The miccus of contosion are	
	operating experience, inspection of a sample of the buried	
	nine should provide for timely detection of aging effects.	
	(6) Acceptance Criteria: In accordance with acceptable	
	industry practice, the assessment of the condition of the	
	coating by conductance and cathodic protection system	
	measurements should be conducted on an annual basis.	
	Monitoring coating conductance or current versus line	
	vill give an indication of the conditions of the coating and	
	Canformation Process, and Administrative Controls: Site	
	corrective actions program, QA procedures, site review and	
	approval process, and administrative controls are	
	implemented in accordance with Appendix B to 10 CFR	
	Part 50 requirements and will continue to be adequate for	
	license renewal. (10) Operating Experience: A one-inch	
	diameter hole with pit walls steeply tapered from the outer	
to the second seco	diameter inward has been discovered in an underground	
	so fice water system operational performance inspection	
	the results have been ascussed in NRC Information	
	Notice (IN) 94-03.	
The AMP relies on preventive actions by	(1) Scope of Program: The AMP relies on selection of	Yes.
selection of corrosion resistant	corrosion resistant materials, corrosion allowance or	-
naterials, design with corrosion	corrosion resistant lining or coating, and ASME Section	
illowance or provision of corrosion	XI inservice inspection (ISI) for managing the effects of	
esistant interior lining or coating, and	AMP also relies on the proper implementation of GL 89-	
as formance with ASME Section XI	13 (2) Preventive Actions: The component is constructed	
tion specified in 10 CFR 50.55a).	of corrosion resistant materials; lining or coating	
	prevents corrosion by protecting the underlying metal	
ble IWD 2500-1, test and examination	=	1
tible IWD 2500-1, test and examination ategory D-B for Class 3 pressure	surfaces from being cosed to corrosive environment.	
ble IWD 25001, test and examination ategory D-B for Class 3 pressure etaining components.	surfaces from being choosed to corrosive environment, and unprotected pinkg (carbon steel used for fresh water	
ble $IWD$ 2500-1, test and examination rategory D-B for Class 3 pressure retaining components.	surfaces from being choosed to corrosive environment, and unprotected pithig (carbon steel used for fresh water systems) are designed with a corrosion allowance.	
Table IWD 2500-1, test and examination category D-B for Class 3 pressure retaining components.	surfaces from being cosed to corrosive environment, and unprotected pickg (carbon steel used for fresh water systems) are designed with a corrosion allowance.	Contra to the
Table TWD 2500-1, test and examination category D-D for Class 3 pressure retaining components.	surfaces from being cosed to corrosive environment, and unprotected pting (carbon steel used for fresh water systems) are designed with a corrosion allowance.	Carlor B Street
The TWD 2500 1, test and examination rategory D-B for Class 3 pressure retaining components.	surfaces from beinfunctoosed to corrosive environment, and unprotected pithing (carbon steel used for fresh water systems) are designed with a corrosion allowance.	Carrier a Tart
The TwD 25001, test and examination category D-B for Class 3 pressure retaining components. GL 89-13 AMA Sce 1WSect #12	surfaces from being choosed to corrosive environment, and unprotected pickig (carbon steel used for fresh water systems) are designed with a corrosion allowance.	randon a serie
The IWD 2500-1, test and examination category D-B for Class 3 pressure retaining components. GL 89-13 AMA See IMSect #12	surfaces from being cosed to corrosive environment, and unprotected pithig (carbon steel used for fresh water systems) are designed with a corrosion allowance.	Contraction in the second
See these the first and examination category D-B for Class 3 pressure retaining components.	surfaces from being cosed to corrosive environment, and unprotected pithig (carbon steel used for fresh water systems) are designed with a corrosion allowance.	and the second sec

	Structure and	Region of	Motoriol	Environ-	Aging	Aging	References
ltem	Component	Interest	Material	ment	Ellect	Wechanish	References
			ļ				
				1			
			4				
					•		
			2				
C1.2.1	Valves (Check Hand	Body and Bonnet	Bronze,	Raw,	Buildup of	Biofouling	NRC GL 89-13.
	& Control	(with or	Stamiess Steel,	Salt Water	Deposit		NRC IN 94-03.
	Valves)	without	Carbon	or Fresh			
		Lining or	fresh water	water			
		Coating)	only)		•		

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C1. OPEN CYCLE COOLING WATER SYSTEM (Service Water System)

C1. OPEN CYCLE COOLING WATER SYSTEM (Service Water System)

Existing		Further
Aging Management Program (AMP)	Evaluation and Technical Basis	Evaluation
Same as for the effect of Biofouling on Item C1.1.1 piping and fittings.	(3) Parameters Monitored/Inspected: ASME Section XI. Table RWD 2500-1, category D-B, requires viral VT-2 examination during system leakage and hydrostatic test. (4) Detection of Aging Effects: Constitution of sulfates and chlorides in salt water can cause pitting and corrosion under crevice conditions, the as gasket surfaces. Joints, and under bolt header Also, systems that use untreated water are susceptible to microbiologically-induced corrosion of -2 examination during system leakage and pressure tests will not detect these forms of corrosion. Therefore, a one-time inspection of representative emponents at susceptible locations should be under then to ensure that significant corrosion is not occurring. This inspection can be visual if the valve is disassembled, and may be covered by the plant maintenance of ogram. UT thickness measurements could also busiesed. Follow up actions are based on the inspection fresults and plant technical specification. (5) Monitoring and Trending: The results of one time inspection should be used to dictate the future inspection. System leakage test is conducted prior to plant startup following each refueling outage and hydrostatic test at or near the end of each inspection interval. (6) Acceptance Criteria: Any relevant conditions that may be detected during the leakage and hydrostatic test are evaluated in accordance with IWD-3000. (7) Corrective Actions: Corrective actions of the inspection. IWA-5250 requires that the source of leakage detected during the pressure test should be located and evaluated for corrective measures. Repair and septacement are in accordance with IWA-4000 and JUK-7000. (8 & 9) Confirmation Process and administrative controls: Site corrective actions program. QA procedures, site review and approval process and administrative controls are implemented accordance with Appendix B to 10 CFR Part 50 equirements and will continue to be adequate for license renewal. [10] Operating Experience-Ething stagnant flow conditions, where impurities in staw and fresh wa	SEE CHANTISC II FOR EVALUATION AND TECHNICAL BASES FOR Application OF GU-BA-13. 2
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	Item	Structure and Component	Region of Interest	Material	Environ- ment	Aging Effect	Aging Mechanism	References
F	131	Heat	Shell	Shell	Shell Side:	Loss of	General.	NRC GL 89-13.
17	hm,	Evchanger	Channel	Channel	Treated	Material	Microbio-	Plant Technical
12	1125	Chatwan anan	Channel Head	Channel	Water	matorial	logically-	Specifications.
Ľ	.1.3.3	(Detween open	Tube Sheet	Unadi	Tube Side		Influenced	
		cycle and	Tube Sheet.	Reau:	Tube Side.		Ditting and	Operating
		closed cycle	Tubes	Carbon	Raw		Crowice	Experience
		cooling water	,	Steel;	Untreated		Crevice	Experience
		systems)		Tube sheet:	Salt or		Corresion	NRC IN 81-21.
				Aluminum-	Fresh Water			NRC IN 85-24.
	1			Bronze;	]			NRC IN 85-30.
				Tubes:				NRC IN 86-96.
			-	Copper-				NRC IN 94-03.
				Nickel	1			
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### C1. OPEN CYCLE COOLING WATER SYSTEM (Service Water System)

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C1. OPEN CTCLE COOLING WATER SYSTEM (Service Water System

Aging Management Program (AMP) Fo shell side of the heat exchanger exped to treated water the AMP rely ventive measures to mitigate on p corros in by monitoring and control of chemistry to minimize the wat exposure to aggressive environments. For tube size of the heat exchanger exposed to untreated salt or fresh water exposed to betreated salt or fresh water the subcomponents are either protected by corrosion registant lining or coating such as channen eads lined with rubber/neopreneur coated with epoxy, or are constructed by corrosion resistant materials such as aluminum-bronze, copper-nicket brass, and stainless steel. Visual inspection, cleaning, and testing, etc., eddy current, of tubes are performed periodically to verify that degradation has not verify that degradation has not occurred. Corrective actions are taken, if significant degradation is und. In addition, GL 89-13 requires t et a program must be implemented and maintained for surveillance an t of control of flow blockage as a res biofouling. It also requires that th heat transfer capability be verified for safety-related heat exchangers coole

AUXILIARY S

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service water system. VIIC1-2 INSTER #12 (SEE CHANTER #11 FOR ODEN CYCLE COOLING WATE SUSTERN INSTE GLEG-13

Evaluation and Technical Basis (1) Coope of Program. The program include onitorin and control of water chemistry to minimize exposure aggressive environments, and staff recommendation Generic Letter (GL) 89-13 or an equivalent program provides assurance that open-cycle cooling water system is in compliance with General Design Criteria and Quality Assurance requirements. Guidelines of GL 89-13 include (a) surveillance and control of biofouling. (b) test program to verify heat transfer capabilities of all heat exchangers cooled by service water (c) routine inspection and maintenance program to ensure that corrosion, erosion, protective coating failure, silting, and biofouling, can not degrade the performance of safety-related systems serviced by open-cycle cooling water, (d) system walkdown inspection to ensure compliance with licensing basis, and (e) renew of maintenance, operating, and training practice procedures. The AMP relies on the proper incidention of GL 00-101-(2) Preventive Actions: shell side, control of water chemistry should mitigat corrosion. For tube side, lining or coating should prevent corrosion by protecting the underlying metal from aggressive environment such as salt water Based on GL 89-13 service water is continuously chlorinated or treated with biocide whenever the potential for biological fouling species exists. (3) Parameters Monitored/Inspected: For the shell side exposed to treated water, the parameters monitored generally include dissolved iron, dissolved copper, dissolved orgen, chloride, suspended solids, etc. These parameters are directly related to corrosion. The program also provides control of the concentrations of oxygen, chlorides, other chemicals, and contaminants. For the tube side exposed to salt or fresh water, corrosion underlying metal will pa lining or coating. Inspection of rubber lining or coating for signs of degradation such as elastomer degradation ensures that corrosion is not occurring. Based on GL 89-13 or its equivalent, open-cycle cooling water system is inspected for biofouling organisms, sediment, protective coating failure, and corrosion; and cooling water flow and temperature are monitored for component performance evaluation to ensure that yow blockage or excessive fouling accumulation dees not occur. (4) Detection of Aging Effects: Monitoring of dissolved iron, dissolved copper, and suspended solids should detect the existence of general ologically-induced corrosion in shell side of the hear exchanger. Plant operating experience confirms beer and from monitoring has resulted in extre low corrosion rates of steel and copper alloys in system. For the tube side, periodic inspection of subcomponents and performance evaluation by eddy current testing should detect occurrence of corrosion. (5) Monitoring and Trending: Effects of corrosion are detectable by iron and periodic inspections should provide for timely detection of aging effects on both stell and tube sides of the heat exchanger. requery of monitoring of treated water usually

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Further

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Item	Component	Region of Interest	Material	Environ- ment	Aging Effect	Aging Mechanism	References 🍙
						-	A A A A A A A A A A A A A A A A A A A
		-				. Starter of the second s	and the second sec
		•					VIICI-S
C1.3.1 thru C1.3.5	Heat Exchanger (between open cycle and closed cycle cooling water systems)	Shell, Channel, Channel Head, Tube Sheets, Tubes	Shell, channel, and channel head: carbon steel: Tube sheet: aluminum- bronze; Tubes: copper- nickel	Shell Side: Treated Water: Tube Side: Raw Untreated Salt or Fresh Water	Buildue of Deposite	Biofouling,	NRC CL 89-13. NRC IN 94-03.

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C1. OPEN CYCLE COOLING WATER SYSTEM (Service Water System)

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#### AUXILIARY SYSTEMS VII

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Aging Management P	rogram (AMP)	Evaluation and Technical Basis	Evaluation
		(Continued from previous page)	
		ranges from several times per week to once a month. Where	
		chemistry monitoring provides data for trending	
		from performance tests to verify heat transformanchilitian	
		are also tranded (6) Accortance Oritaria, the signs of	
		are also dended. (6) Acceptance Criteria: my signs of	
		degradation and corrosion should be exported and	
		evaluated. Any lining degradation should be repaired.	
		The water chemistry control rogram provides	
		specification of chemical parameters and acceptable	
		levels. (7) Corrective Actions: Plant chemistry control	
		program specifies ta yet values for parameters in the	
1	-	treated water. If the specified values are exceeded	
		a carea water. There specifical values are exceeded,	
		corrective a doils are initiated to return the chemistry	
		parameters to normal levels. (8 82 9) Confirmation	
		Process, and Administrative Controls: Site corrective	
		actions program, QA procedures, site review and approv	•
1		process, and administrative controls should be	
		implemented in accordance with Appendix B to 0 CFR	
	l	Part 50 requirements and should continue for license	
		renewal (10) Operating Experies Cidnificant	
1		microbiologically influenced	
1		Interosiologically-influenced portosion (NRC	
1		mormation Notice (IN) 85-30), failure of protective	
		coating (IN 85-24), and Touling (IN 81-21, 86-96) has been	
	1	observed in a number of heat exchangers. Significant wall	
		thinning has been observed on the ID of heat exchanger	
		tubes. Tube heads coated with epoxy have experienced	
		the uph-wall holes attributed to corrosion. The NRC	
	1	And the second and and the constrained and the	
1	ľ	increation and the results have have dimensional performance	
1		Inspection and the results have been discussed in twRC	
1		information Notice (IN) 94-03. Although the AMP	
		provides an effective means teaching, the effects of	A State of the sta
		corrosion on the intended function of the exchanger. IN	t.
	$\sim$	89-16 indicates that deficiencies still exist in	
▼	<b>V</b>	in plementation of GL 89-13.	•
In Asponse to Generic Le	tter (GL) 89-13.	The product of the pr	No
industry implemented st	urveillance and	related heat exchangers and their subcomponents	
control rogram to many	age flow	Promontine Actions: Annual unter compliant	
blockage roblems in an	en-ovola comitan	treatment with biogide reduces the low the second	
· · · · · · · · · · · · · · · · · · ·	en-cycle service	area micht with biocide reduces the inter of micro-	
mater excertine di terre	JUDITS SUL	organism activities. (3) Parameters Monitored/Inspected:	
water system due to biofo		The AMD memitene mater all in sets and inless and such as	
water system due to biofo mud, and corrosion produ	ucts. The	The AMP monitors water now rate and milet and outlet	
water system due to biofe mud, and corrosion produ program generally includ	ucts. The les: (1)	temperatures which are directly affected by flow blockage.	
water system due to blok mud, and corrosion produ program generally includ Sampling the water annu	ucts. The les: (1) ually to	temperatures which are directly affected by flow blockage. (4) Detection , Aging Effects: Comparison of flow rate and	
water system due to biofc mud, and corposion produ program generally includ Sampling the water annu determine if the biologics	ucts. The les: (1) ually to ul species have	temperatures which are directly affected by flow blockage. (4) Detection , Aging Effects: Comparison of flow rate and inlet and outlet temperatures with previous results and	
water system due to biofu mud, and corrosion produ program generally includ Sampling the water annu determine if the biologica populated the water our	ucts. The les: (1) ually to 1 species have	the part of the second	
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## C1. OPEN CYCLE COOLING WATER SYSTEM (Service Water System)

Item	Structure and Component	Region of Interest	Material	Environ- ment	Aging Effect	Aging Mechanism	References
		merest	Matchat		Billet	-	
C1.4.1	Flow Orifices	Body	Stainless Steel	Raw, Untreated Salt Water or Fresh Water	Loss of Material	General, Micro- biologically -Induced, Pitting, and Crevice Corrosion	Plant Technical Specifications. NRC IN 94-03.
C1.4.1	Flow Orifices	Body	Stainless Steel	Raw, Untreated Salt Water or Fresh Water	Buildup of Deposit	Biofouling	NRC GL 89-13. NRC IN 94-03.
C1.5.1	Pump	Casing	Cast Steel, Carbon Steel	Raw, Untreated Salt Water or Fresh Water	Loss of Material	General, Micro- biologically -Induced, Pitting, and Crevice Corrosion	ASME Section XI, 1989 Edition. ASME OM Code- 1990, Subsection ISTB. NRC GL 89-04. Plant Technical Specifications.

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### C1. OPEN CYCLE COOLING WATER SYSTEM (Service Water System)

Existing		Further
Aging Management Program (AMP)	Evaluation and Technical Basis	Evaluation
(Continued from previous page) test in performed once each fuel cycle and after three tests, the test should be performed at least once every 5 years. (4) if the heat exchangers fail to perform adequately, correcting actions such as cleaning and repair are taken.	Continued from previous paged confirmation Process, and Administrative Controls site corrective actions program. QA procedures, site feview and approval process, and administrative controls are implemented in accordance with appendix B to 10 CFR Part 50 requirements and site continue to be adequate for license renewal. (16) Operating Experience: Extensive flow blockage by tams has caused plant shutdown. The heat exchangers have experienced degraded thermal frequent cleaning and restrictions of operational flexibility. The NRC performed service under system operational performance inspection and the results have been discussed in NRC in formation Notice (IN) 94-03.	LUSERT #12
Same as or the effects of General, Microbiologically-Induced, Pitting, and Crevice Corrosion on Item C1.1.1 piping and fittings.	Same as for the effects of General, Microbiologically- Induced, Pitting, and Crevice Corrosion on Item C1.1.1 piping and fittings.	Yes, Element 4 should be further evaluated.
Same as for the effects of Biofouling on Item C1.1.1 piping and fittings.	Same as for the effects of Biofouling on Item C1.1.1 piping and fittings.	No
The AMP relies on preventive actions by providing corrosion resistant interior linings or coating, and inservice inspection (ISI) in conformance with ASME Section XI (edition specified in 10 CFR 50.55a). Table IWD 2500-1, test and examination citegory D-B for Class 3 pressure retaining components; and based on the testing requirements of 10 CFR 50.55a for ASME Code Class 3 pumps, and additional NRC staff guidelines in Generic Letter 89-04, inservice testing performed in accordance with ASME Subjection IWP (or Operation and Maintenance Code Subsection ISTB) for pumps, or other approved program in the plant technical specifications.	(1) The AMP relies on corrosion resistant linings and coating and combination of inservice inspection [ISI] and inservice testing [IST] for managing the effects of corrosion on the intended function of the component. (2) Preventive Actions: Lining and coating prevent corrosion by protecting the underlying metal surfaces from being exposed to corrosive environment. (3) Parameters Monitored/Inspected: The AMP monitors the effects of corrosion by ISI to detect system water leakage and IST to evaluate component performance. Requirements of ASME Section XI, Table IWD 2500-1, corrosion JD-B, specify visual VT-2 (IWA-5240) examination in this system leakage and hydrostatic test of all pressure retaining Class 3 components. Based on the requirements of 10 CFR 50.55a for ASME Code Class 1, 2, and 3 pumps and additional guidelines of NRC General Letter (GL) 89-04, IST is performed in accordance with ASME Subsection IWP (or OM Code Subsection ISTB). (4) Detection of Aging Effects: Concentration of sulfates and chlorides in salt water can cause pitting and crevice corrosion under crevice conditions such as gasket surfaces, joints, and under foit heads. Also, systems that use untreated water	Nor al 89-15
ATER SHANTER #11 FOR NENI CYCLE CODU ATER SUSTEM IN 189-13	VII CI-I7 DRAFT -	12/06/99

Item	Structure and Component	Region of Interest	Material	Environ- ment	Aging Effect	Aging Mechanism	References
Item	Component	Interest	Material	ment	Lilect	-	Reierences
C1.5.1	Pump	Casing	Cast Steel, Carbon Steel	Raw, Untreated Salt Water or Fresh Water	Buildup of Deposit	Biofouling •	NRC GL 89-13. NRC IN 94-03.
C1.6.1	Basket Strainer	Body	Carbon Steel, Stainless Steel	Raw, Untreated Salt Water or Fresh Water	Loss of Material	General, Micro- biologically -Induced, Pitting, and Crevice Corrosion	Plant Technical Specifications. NRC IN 94-03.
C1.6.1	Basket Strainer	Body	Carbon Steel. Stainless Steel	Raw, Untreated Salt Water or Fresh Water	Buildup of Deposit	Biofouling	NRC GL 89-13. NRC IN 94-03.

C1. OPEN CYCLE COOLING WATER SYSTEM (Service Water System)

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C1. OPEN CYCLE COOLING WATER SYSTEM (Service Water System)

Aging Management Program (AMP)	Evaluation and Technical Basis	Further Evaluation
Same as for the effects of Biofouling on Item C1.1.1 piping and fittings.	<ul> <li>(C. and four proved page)</li> <li>are susceptible to microbiologically-induced corrosion</li> <li>VT-2 examination during system leakage and pressure</li> <li>tests will not detect these forms of corrosion interefore, a</li> <li>one-time inspection of representative components and</li> <li>susceptible locations should be under aken to ensure that</li> <li>significant corrosion is not occurring. This inspection</li> <li>can be visual if the pump is disassembled, and may be</li> <li>covered by the plant mintenance program. UT thickness</li> <li>measurements could also be used. Follow up actions are</li> <li>based on the dispection results and plant technical</li> <li>specification. (5) Monitoring and Trending: The results of</li> <li>one-time inspection should be used to dictate future</li> <li>dispecification. System leakage test is conducted prior to plant</li> <li>startup following each refueling outage, and hydrostane</li> <li>test at or near the end of each inspection interval.</li> <li>(6) Acceptance Criteria: Any relevant conditions during the leakage and hydrostane</li> <li>test at or near the end of each inspection interval.</li> <li>(6) Acceptance Criteria: Any relevant conditions are</li> <li>evaluated in accordance with IWD-3000 for Class 3</li> <li>components. (7) Corrective Actions: : Corrective actions of</li> <li>the above one time inspection are based on the results of</li> <li>the inspection. IWA 2050 requires that the source of</li> <li>leakage detected during the pressure test should be located</li> <li>and evaluated for corrective measures. Repair and</li> <li>replayment are in accordance with IWA-4000 and IWA-</li> <li>VOO. (8 &amp; 9) Confirmation Process and Administration</li> <li>controls: Site QA procedures, review and approval</li> <li>processes, and administrative controls are implemented</li> <li>in accordance with requirements of Appendix B to 10 CFR</li> <li>Part 50 and will continue to be accutate for the period of</li> <li>license renewal., (10) Operating Experience: Pittin</li></ul>	Νο
Same as for the effects of General, Microbiologically-Induced, Pitting, and Crevice Corrosion on Item C1.1.1 piping and fittings.	Same as for the effects of General, Microbiologically- Induced, Pitting, and Crevice Corrosion on Item C1.1.1 piping and fittings.	Yes, Element 4 should be further evaluated
Same as for the effects of Biofouling on Item C1.1.1 piping and fittings.	Same as for the effects of Biofouling on Item C1.1.1 piping and fittings.	No

# GALL REPORT-MECHANICAL DISCIPLINE COMMENTS SECTION VIIC.1

GALE SECTION	TITLE	ITEM NO.	PAGE	REVIEWER	COMMENT
VII C1-1	Open Cycle Cooling Water System	C1.1.1. C1.2.1 C1.3.1 Thru C.1.3.5 C.1.4.1 C1.5.1 C1.6.1	Various		<ul> <li>GL 89-13 should be used to detect any material degradation or biofouling associated with the open cycle cooling water systems.</li> <li>Reference to ASME Section XI, OM code, GL 89-04, and Tech Specs should be deleted from References, AMP and Evaluation and Technical Basis columns, as applicable. The AMA should only be the "Open Cycle Cooling Water System Inspections (GL 89-13)" program. Refer to the proposed program description.</li> <li>Hence, no further evaluation is required.</li> </ul>
VII C1-2	Open Cycle Cooling Water System	C1.1.1. C1.2.1 C1.3.1 Thru C.1.3.5 C.1.4.1 C1.5.1 C1.6.1	VII C1-4		<ul> <li>Copper alloys and stainless steels are not subject to General Corrosion. Remove these materials from any groupings with carbon steel and create new line item.</li> <li>Aging effect should be loss of material with the related aging mechanisms of pitting corrosion, crevice corrosion, and MIC. The AMA should only be the "Open Cycle Cooling Water System Inspections (GL 89-13)" program. Refer to the proposed program description.</li> <li>Hence, further evaluation is not warranted.</li> </ul>
VII C1-3	Open Cycle Cooling Water System	C1.1.1	VII C1-6		General corrosion of lined carbon steel is listed as an aging mechanism. Lined carbon steel pipe may be susceptible to localized corrosion in areas of lining degradation but will not be susceptible to gross wastage. This position was accepted in the CCNPP SER.
VII C1-4	Open Cycle Cooling Water System	C1.1.2	VII C1-7		Buried piping will be treated differently at each utility based on the system design as well as management philosophy. Therefore, the existing AMA description should be deleted in its entirety and replaced with requiring a plant specific activity. Hence, further evaluation is warranted.
VII C1-5	Open Cycle Cooling Water System	C1.3.1 Thru C1.3.5	VII C1-14		In the Aging Mechanism column, delete reference to MIC as an aging mechanism related to the Buildup of Deposit aging effect. MIC is already addressed with the Loss of Material aging effect.

# C2. Closed Cycle Cooling Water System

C2.1 Piping

C2.1.1 Pipe, Fittings, and Flanges

C2.2 Valves (Check, Hand, Control, Relief, and Solenoid Valves)

C2.3.1 Body and Bonnet

C2.3 Pump

C2.3.1 Casing

C2.4 Tank

C2.4.1 Shell

C2.5 Flow Orifice

C2.5.1 Body



#### C2. Closed Cycle Cooling Water System

## System, Structures, and Components

The system, structures, and components included in this table, comprise the closed cycle cooling water system which consists of piping, valves, radiation element, temperature element, heat exchangers, pumps, tank, and flow orifices. The system contains chemically treated demineralized water. The closed cycle cooling water system is designed to remove heat from various auxiliary systems and components such as chemical and volume control system, spent fuel cooling system, etc. The open cycle cooling water system (Table VII C1) provides the cooling medium for the heat exchangers of the closed cycle cooling water system which serves as an infermediate barrier between the various supplied auxiliary systems and the open cycle cooling water system. Based on US Nuclear Regulatory Commission Regulatory Guide 1.26, "Quality Group Classifications and Standards for Water, Steam, and Radioactive-Waste-Containing Components of Nuclear Power Plants," all components in the closed cycle cooling water system are classified as Group C Quality Standards.

The AMPs of the heat exchanger between the closed cycle and the open cycle cooling water systems are addressed in the open cycle cooling water system (Table VII C1). The AMPs of the heat exchangers between the closed cycle cooling water system and the interfacing auxiliary systems are included in their respective systems, such as Table VII A.3 for PWR spent fuel cooling water system, Table VII A4 for BWR spent fuel pool cooling and cleanup system, and Table VII E1 for chemical and volume control system.

Pumps and valves are considered to be active components and pump internals and seats, discs, bolting, and other valve items should be covered by the plant maintenance program.

#### System Interfaces

The systems that interface with the closed cycle cooling water system include the open cycle cooling water system (Table VII C1), PWR spent fuel cooling water system (Table VII A3), BWR spent fuel cooling water system (Table VII A4), chemical and volume control system (Table VII E1), and other miscellaneous auxiliary systems and components.

VII .	AUXILIARY SYS	TEMS			5	2		
	C2. CLOSED	CYCLE COOLING	WATER SYST	EM C	Arian		<u> </u>	
Item	Component	Region of Interest	Material	Environ- ment 1	Effect	Mechanism	References	
C2.1.1	Piping	Pipe, Fittings,	Carbon		Loss of	General	tille Seatorril,	
		and Flanges	Steel (25)	Chemically	Mr cerial	Pitting, and	LOGO BANET.	
				freated De-		Creace	Specifications.	2
	· ·			Water			op op op of a state of	
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AUXILIARY YSTEMS VII CLOSED CYCLE COOLING WATER SYSTEM C2 Further Existing Evaluation Evaluation and Technical Basis Aging Management Program (AMP) Scope of Program. The program relies on monitor Yes The AMP relies on minimizing and maintaining the chemistry of the process fluid impurities by monitoring and ASME Section XI inservice inspection (ISI) to premage the maintaining the chemistry of system effects of general, pitting, and crevice concision on the water implemented through plant intended function of the componenter (2) Preventive technical specifications and inservice Actions: The AMP consists of monitoring and controlling inspection (ISI) in conformance with the system water chemister (i.e., the chemically treated ASME Section XI (edition specified in 10 demineralized water to mitigate the corrosion effects and CFR 50.55a), Table IWD 2500-1, test and to ensure that adverse chemistry conditions are examination category D-B for Class 3 present. Minitoring and maintaining the chemistry pressure retaining components. conditions of the demineralized water will help to VIICZate the effects of component degradation by controlling the impurities in the system fluid. (3) Parameters Monitored/Inspected: The prog generally contains chemical parameter specifications. COOLING WATER CHEMISTRY PROGRAM (SEE CHAISTER # 11) sampling frequency, analysis and corrective actions. The parameters monitored generally include dissolved iron, dissolved copper, chlorider, dissolved oxygen, suspended solids, pH, and hydroene. They are directly related to potential of correction. ASME Section XI, Table IWD 2500-1, examination category D-B requires visual VT-2 examination during system leakage and hydrostatic test. etection of Aging Effects: Within the closed cycle cooling water system, there are regions of low or sta flow conditions where impurities and/or corrosi chemicals may concentrate and cause crevice and pitting corrosion. VT-2 examination of ASME Section XI, Table IWD 2500-1 will not detect pitting and crevice corrosion. Therefore, a one-time inspection such as visual examination or UT thickness measurements should be conducted of representative components and susceptible locations to assure that significant corrosion is not CH CH occurring. Based on piping/component geometry, fluid conditions, lowest-design margin, and time of f. susceptible locations can be identified. Follow up action are based on the inspection results and plant teatrical specification. (5) Monitoring and Trending. The frequency of water chemistry monitoring ranges from several times per week to once a month. The results should provide data for frending. The result of one-time inspection should be used to dictate future inspection. System leakage test is conducted prior to plant startup following each refueling outage, and hydrostatic test at or The end of each inspection period. (6) Acceptance criteria: The chemistry monitoring program provide specification of chemical parameters and acceptable levels. Any relevant conditions that may be detected during the leakage and hydrostatic teres are evaluated in accordance with ASME Section 11 IWD-3000. (7) Corrective Actions: Plant chemistry control program specifies the target values for each chemistry parameter in the treated water. If the specified values are exceeded, nerve actions are initiated to bring the chemistry parameters back to normal levels. Corrective action the above one-time inspection are based on the results of the inspection. Furthermore, IWA-5250 sequires that the source of

#### VII AUXILIARY SYSTEMS C2. CLOSED CYCLE COOL

# 2. CLOSED CYCLE COOLING WATER SYSTEM



#### AUXILIARY SYSTEMS VII



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VII AUXILIARY SYSTEMS

C2. CLOSED CYCLE COOLING WATER SYSTEM									
•.	Structure and	Region of	Matarial	Environ-	Aging	Aging	Deferences		
Item	Component	Interest	Material	ment	Effect	weenamsm	References		
	- -				VIICZ	3	JII CARI		
					To a f	Canami	ASME Continue		
(2.3.1	Pump			Chemically Treated De- mineralized Water	Miterial	Pitting, an Crevice Corroston	ISTB. NRC GL 89-04. Plant Technical Specifications.		

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## I AUXILIARY SYSTEMS

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#### AUXILIARY SYSTEMS VII

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Existing Aging Management Program (AMP)	Evaluation and Technical Basis	Further Evaluation
	chemistry control program specifies the target values for each chemistry parameter in the treated water. If the specified values are exceeded, corrective actions are initiated to bring the chemistry parameters back to normal levels. Corrective actions of the above one-time inspection are based on the results of the inspection. IWA- 5250 requires that the setting of leakage detected during	
-	5250 requires that the balance of heading of evaluated for corrective measures. Repair and replacement are in accordance with IWA-4000 and IWA-7000. (8 & 9) Contraction Broots and Ammistrative controls: Str QA procedures, review and approval processes, and administrative controls are implemented in accordance with requirements of Appendix B to to CFR Part 50 and	
	will continue to be adequate for the period of license renewal. (10) Operating Experience: Localized consolion is likely to occur an revice gentinetry where buildup of impunities can occur	
The applicable AMP, implemented by the plant technical specifications, relies on minimizing impurities by monitoring and maintaining water	and maintaining water chemistry, inservice inspection (ISI) and inservice testing (IST) to manage the efforts of general, pitting, and crevice corrosion on the component.	Flement de
chemistry, inservice inspection in conformance with ASME Section XI (edition specified in 10 CFR 50.55a). Table IWD 2500-1, test and examination	(2) Preventive Actions: The AMP consists of monitoring and maintaining the system water chemistry to minimize impurities in the system fluids. The program generally contains chemical parameter specifications, sampling	NO
category D-B, and based on the testing requirements of 10 CFR 50.55a for ASME Code Class 3 pumps and valves, and additional staff guidelines of NRC	frequency, analysis, and corrective actions. Chemical parameters, such as concentrations of chloride, sulfate, oxygen, and impurities are monitored and controlled. (3) Parameters Monitored/Inspected: The AMP monitors the effects of corrosion by ISI to detect leakage and IST to	240
accordance with ASME Subsection IWP (or Operation and Maintenance Code Subsection ISTB) for pumps, or other approved program in the plant	requirements of ASME Section XI, Table IWD 2500-1, category D-B, specify visual VT-2 (IWA-5240) examination during system leakage and hydrostatic test of an pressure	1015 1015
technical specifications.	retaining Class 3 components. Based on the requirements of 10 CFR 50.55a for ASME Code Class 1, 2, and 3 pumps and additional guidelines of MC Generic Letter (GL) 89-04. IST is performed in accordance with ASME Subsection IST (All Detection of Aging	12ch
CLOSES	<i>Effects:</i> Within the closed cycle cooling water system, there are regions of low or stagnant flow conditions where imputties and/or corrosive chemicals may concentrate	Della I
WATTER WATTER MHEMISTRY	examination of ASME Section XI. Table IWD 2500-1 m not detect pitting and crevice corrosion. Therefore, a one- time inspection of representative components and susceptible locations should be undertaken to ensure that	North Contraction
WILDGINKIN	significant corrosion is not occurring. This inspection can be visual if the	and a
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#### AUXILIARY SYSTEMS VII

#### CLOSED CYCLE COOLING WATER SYSTEM C2. Aging Aging Environ-Region of Structure and References Effect Mechanism ment Material Interest Component Item JIICZ VIICE 1.14.14 General, Loss of Shell C2.4.1 Tank Co.Edition.... Pitting, an Chemically Material Plant Technical Crevice Treated Demineralized Corrosion Specification. Water Loss of General, A SS Flow Orifice Body C2.5.1 Pitting, and Material Chemically Plant Technical Treated De-Crevice Specification. mineralized Corrosion Water

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Existing Aging Management Program (AMP)       Evaluation and Technical Basis       Further Evaluation         /continued_from previous proces       pump is disassembled, and may be covered by the plant maintenance program. UT thickness measurements shuld also be used. Follow up actions are based on the respection results and plant technical specification. (5) bonnitoring and Trending: The frequency of water challstry monitoring ranges from several timegifer week to once a month. The results should provide data for trending. The result of one-time inspection should be used to dictate future inspection. System blackage test is conducted prior to plant startup following each refueling outage, and hydrostatic test at onlear the end of each inspection period. (6) Acceptione Criteria: The chemistry monitoring program program specifies the target values for each evaluation of chemical parameters and acceptible levels. Any relevant conditions that may be detected during the leakage and hydrostatic tests are evalued in accordance with IND-3000 for Class 3 connegetis. (7) Corrective Actions are Initiative control program specifies the target values for each chemistry parameter in the treated water. If the specified values are exceeded, corrective actions are inspection are based on the results of the above once with easures. Repair and replacement are to accordance with IWA-5200 requires that the source of leakage dicted during the pressure test should be located and mutuated for corrective actions are inspection and IWA-7000. K& 9) Confirmation Process and Administry parameter in accordance with IWA-4000 and IWA-7000. K& 9 Confirmation Process and Administry the controls: Site QA procedures, review and approxy processes, and administrative controls are imponented in accordance with requirements of theordive B to 10 CFE Part 50 and will continue to be adequate for the periof 0 licenserenewal. (10) Operation Experience: Localized corrosion	Evisting		Trees and be a set
Aging Management Program (AMP)       Evaluation and reminate basis       Evaluation            (antinued from previous aced minp is disassembled, and may be covered by the plant maintenance program. UT thickness measurements will also be used. Follow up actions are based on the dispection results and plant technical specification. (5) ionitoring and Trending: The frequency of water challstry month. The results should provide data for trending. The result of one-time inspection should be used to dictate future inspection. System dikage test is conducted prior to plant startup following each reflueling outage, and hydrostatic test at othear the end of each inspection period. (6) Accentione Criteria: The chemistry monitoring program proties specification of chemical parameters and accentible levels. Any relevant conditions that may be detected during the leakage and hydrostatic tests are evaluated in accordance with IWD-3000 for Class 3 control program specifies the target values for each chemistry parameter in the treated water. If the greeffiled values are exceeded, corrective actions are initiated to bring the chemistry parameters back to formal levels. Corrective actions of the above one are inspection are based on the results of the inspection are based on the results of the inspection income and and replacement are in accordance with IWA-5250 requires that the source of leakage directed during the pressure test should be located and valuated for corrective measures. Repair and replacement are in accordance with IWA-4000 and IWA-7000. Is & 9 Confirmation Process and Administrative controls: Site QA procedures, review and approyer processes, and administrative controls are	DAISting	Public the and Technical Papia	Further
(ontinued from prepuist 5000) pump is disassembled, and may be covered by the plant maintenance program. UT thickness measurements could also be used. Follow up actions are based on the tespection results and plant technical specification. (5) ionitoring and Trending: The frequency of water chemistry monitoring ranges from several timesper week to once a month. The results should provide data for trending. The result of one-time inspection should be used to dictate future inspection. System lakage test is conducted prior to plant startup following each refueling outage, and hydrostatic test at onear the end of each inspection period. (6) Acceptione Criteria: The chemistry monitoring program provides specification of chemical parameters and acceptible levels. Any relevant conditions that may be detened during the leakage and hydrostatic tests are evaluated in accordance with WD-3000 for Class 3 comments. If Connective Actions: Plant chemistry control program specifies the target values for each chemistry parameter in the treated water. If the genetified values are exceeded, corrective actions are installed to bring the chemistry parameters back to formal levels. Corrective actions of the above one time inspection are based on the results of the inspection are based on the results of the inspection are based on the results of the corective measures. Repair and replacement are in accordance with WA-4000 and WA-7000. St 29 Confirmation Process and Administrative Controls: Site QA procedures, review and approve processes, and administrative controls are implemented in accordance with requirements of thending the period of license renewal. [10] Operating Experience: Localized corrosion is likely to come at flange experience: Localized corrosion is likely to come at flange experience and action for the publicity control are implemented in accordance with requirements of the dependent of the period of license renewal. [10] Operating Experience: Localized corrosion is likely to come	Aging Management Program (AMP)	Evaluation and Technical Basis	Evaluation
occur.	for the effects of Caparol	pump is disassembled, and may be covered by the plant maintenance program. UT thickness measurements could also be used. Follow up actions are based on the trispection results and plant technical specification. (5) Honitoring and Trending: The frequency of water chanistry monitoring ranges from several timesper week to once a month. The results should provide data for trending. The result of one-time inspection about be used to dictate future inspection. System Lakage test is conducted prior to plant startup following each refueling outage, and hydrostatic test at othear the end of each inspection period. (6) Acceptance Criteria: The chemistry monitoring program provides specification of chemical parameters and acceptible levels. Any relevant conditions that may be detered during the leakage and hydrostatic tests are evaluated in accordance with IWD-3000 for Class 3 comments. (7) Corrective Actions: Plant chemistry control program specifies the target values for each chemistry parameter in the treated water. If the specified values are exceeded, corrective actions are initiated to bring the chemistry parameters back to formal levels. Corrective actions of the above one time inspection are based on the results of the inspection. IWA-5250 requires that the source of leakage detected during the pressure test should be located and valuated for corrective measures. Repair and replacement are in accordance with IWA-4000 and IWA-7000. In & 9) Confirmation Process and Administrative Controls: Site QA procedures, review and approve processes, and administrative controls are implemented in accordance with requirements of thendix B to 10 CFR Part 50 and will continue to be adequate for the period of license renewal. (10) Openating Experience: Localized corrosion is likely to occur at flange connections and crevices where buildung timpurities can occur.	
	Same as for the effects of General, Pitting, and Crevice Corrosion on Items C2.1.1 pipe, fittings, and flanges.	Same as for the effects of General, Pitting, and Crevice Corrosion on Items C2.1.1 pipe, fittings, and flanges.	Yanna and Andrews

# GALL REPORT-MECHANICAL DISCIPLINE SECTION VIIC.2

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GALL SECTION	TITLE	ITEM NO.	PAGE	REVIEWER	
VII C2-1	Closed Cycle Cooling Water System	C2.1.1 C2.2.1 C2.3.1 C2.4.1 C2.5.1	Various		Control of chemistry for treated water environments is sufficient to manage SCC, pitting and crevice corrosion. Reference to ASME Section XI, OM code, GL 89-04, and Tech Specs should be deleted from References, AMP and Evaluation and Technical Basis columns, as applicable. The AMA should only be the " <i>Closed Cooling Chemistry</i> " program. Refer to the proposed program description. Hence, no further evaluation is required.
VII C2-2	Closed Cycle Cooling Water System	C2.1.1	VII C2-4		The aging effect should simply refer to the "Loss of Material" in lieu of "Local Loss of Material"
VII C2-3	Closed Cycle Cooling Water System	C2.1.1 C2.2.1 C2.3.1 C2.4.1 C2.5.1	VII C2-4 VII C2-6 VII C2-8 VII C2-10 VII C2-10		Delete reference to 35° C in the Environment column. This temperature adds no value to the identification to aging mechanisms or effects. If not, then translate into Fahrenheit.
VII C2-4	Closed Cycle Cooling Water System	C2.5.1	VII C2-10		Stainless steel is not susceptible to general corrosion. Delete general corrosion in the Aging Mechanism, AMP and Evaluation and Technical Basis columns.

# C3. Ultimate Heat Sink

- C3.1 Cooling Tower
  - C3.1.1 Foundation
  - C3.1.2 Exterior Concrete Above Grade
  - C3.1.3 Exterior Concrete Below Grade
  - C3.1.4 Interior Slabs
  - C3.1.5 Masonry Block Wall
  - C3.1.6 Concrete Surfaces Exposed to Flowing Water
  - C3.1.7 Columns
  - C3.1.8 Base Plates
  - C3.1.9 Beams
  - C3.1.10 Trusses
  - C3.1.11 Bracings
- C3.2 Piping
  - C3.2.1 Piping and Fittings
- C3.3 Valves (Check, Hand, and Control Valves)

C3.3.1 Body and Bonnet

- C3.4 Pump
  - C3.4.1 Casing

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### C3. Ultimate Heat Sink

#### System, Structures, and Components

The ultimate heat sink consists of a lake, ocean. river, spray pond, or cooling tower and provides sufficient cooling water for safe reactor shutdown and reactor cooldown via the residual heat removal system or other similar system. Due to the varying configurations of connections to lakes, oceans, and rivers, a plant specific aging management program is required. With respect to spray ponds, the spray modules should be covered by the plant maintenance program, and a plant specific aging management program is also required for the spray pond as an entity. Therefore, this table only addresses cooling towers.

The systems, structures and components included in this table consist of piping, valves, pumps, and concrete and steel components such as concrete walls, slabs, foundation, steel beams, columns, and base plates. The cooling tower contains raw or slightly treated fresh water. The ultimate heat sink absorbs heat from the open cycle cooling water system. The cooling tower is classified as Class 1 structures and other components such as piping and valves as Class 3.

Pumps and valves are considered to be active components and pump internals and seats, discs, and other valve items should be covered by the plant maintenance program.

#### System Interfaces

The systems that interface with the ultimate heat sink include the open cycled cooling water system (Table VII C1), containment spray system (Table V A), and emergency core cooling systems (Tables V D1 and D2).

# VII

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Item	Structure and Component	Region of Interest	Material	Environ- ment	Aging Effect	Aging Mechanism	References
C3.1.1	Cooling Tower	Foundation	Reinforced	Soft Soil	Cracking,	Settlement	NUREG-1557.
			Concrete	and Ground	Distortion		ACI 318-63.
				water	in increase		ACI 343-65.
					Component	-	
					Stress Level		
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		-					
						-	
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# AUXILIARY SYSTEMS C3. ULTIMATE HEAT SINK

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C3 ULTIMATE HEAT SINK		
Existing		Further
Aging Management Program (AMP)	Evaluation and Technical Basis	Evaluation
Aging Management Frogram (AMP) Cracking, distortion, and increase in component stress level due to settlement of structure foundations is managed by the structure settlement monitoring program initiated during construction and continued monitoring during operation (NUREG-1557. " Summary of Technical Information and Agreement from Nuclear Management and	(1) Scope of Program: The program is focused on managing the effects of settlement on the intended function of the component. (2) Preventive Actions: Consideration of differential settlement is required by design codes, such as ACI 318-63 and ACI 349-85. A value of 0.0033 is commonly used as upper design limit for the slope of a settled structure (i.e., the difference in settlement for two points divided by the distance between those two points). Structure settlement monitoring initiated during plant	No
Resources Council Industry Reports Addressing License Renewal". Oct 1996). The program consists of measurement of differences on elevations of the structure over a period of time. The structure settlement monitoring program initiated during construction and continued during operation provides identification of any differential settlement and allows	construction provides confirmation that the actual settlement of the structure is consistent with the allowances included in the design basis. The settlement monitoring program continued into operation provides long-term monitoring of settlement (absolute and differential) for sites with soft soil and/or significant changes in ground water. The structure settlement monitoring program initiated during construction and continued during operation should provide identification of any significant (greater than the limit cited above)	
differential settlement and allows appropriate measures to be taken.	of any significant (greater than the limit theo above) differential settlement and allows appropriate measures to be taken before there is a loss of the intended function of the structural foundation. (3) Parameters Monitored/Inspected: The parameter monitored is the settlement (absolute and differential) of foundation over a period of time. (4) Detection of Aging Effects: Structure settlement monitoring should detect significant differential settlement for sites with soft soil and/or significant ground water changes and allows appropriate measures to be taken before there is a loss of the intended function of the structural foundation. (5) Monitoring and Trending: The long-term settlement monitoring program provides measurement of settlement and data for trending. (6) Acceptance Criteria: A value of 0.0033 (NUMARC Report 90-10, "BWR Containments License Renewal Industry Report", Rev. 1, Dec., 1991) is the limit for the slope of a settled structure (i.e., the difference in settlement for two points divided by the distance between those two points). (7-9) Corrective Actions, Confirmation Process, and Administrative Controls: Site corrective actions program, QA procedures, site review and approval process, and administrative controls are implemented in	
	accordance with Appendix B to 10 CFR Part 50 requirements and will continue to be applicable for license renewal. (10) Operating Experience: Cracking, distortion, and increase in stress can be caused by settlement of structural foundations for sites with soft soil and/or significant changes in ground water conditions, such as lowering of the water table. Long-term settlement could exceed plant design limits. Settlements of structural foundation have occurred for sites with soft soil and/or significant changes in ground water conditions, such as lowering of the water table.	•

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### VII AUXILIARY SYSTEMS C3 ULTIMATE HEAT SINK

	S. ULIMAI	C NEAT SINK					······
Item	Structure and Component	Region of Interest	Material	Environ- ment	Aging Effect	Aging Mechanism	References
C3.1.1 thru C3.1.4	Cooling Tower	Foundation. Exterior Concrete Above Grade,	Reinforced Concrete	Outdoor Ambient Conditions	Scaling, Cracking, and Spalling	Freeze- Thaw -	NUREG-1557. ACI 318-63. ACI 349-85.
		Concrete Below Grade, and Interior Slabs					
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Existing Aging Management Program (AMP) The AMP should consist of walkdown and inspections to detect scaling, cracking, and spalling due to freeze- thaw. (1) Scope of Program: The program relies on the preventive freeze-thaw resistance of the concrete propard in accordance with ACI 318-63 or ACI 349-85, which requires an appropriate amount of entrained air and water-to- cement ratio for freeze-thaw resistance of the concrete propard in accordance with ACI 318-63 or ACI 349-85, which requires an appropriate amount of entrained air and water-to- cement ratio for freeze-thaw resistance of MAST C33-62, "Standard by eather ratio for freeze-thaw resistance of MAST C33-62, "Standard Specification for Concret Aggregates," Freeze-thaw is not significant for concret Aggregates," Freeze-thaw is not significant for concret Aggregates," Freeze-thaw is not significant for concret Aggregates, "Freeze-thaw is not significant for concret Aggregates," Freeze-thaw is not significant for concret Aggregates, "Freeze-thaw is not significant for for serve exposure) and has a low water-to- cement ratio (0.48-0.5). Concret prepared in accordance with ACI 318-63 or ACI 349-65 social 4.5. "Special Exposure Requirements," of ACI 349-65 specifies that concret exposed to freeze-thaw is required by design codes ACI 349-65 contains an appropriate amount of entrained air necessary for freeze-thaw is water-to-cement ratio (0.48-0.5). Concrete prepared in accordance with ACI 318-63 or ACI 349-65 contains an appropriate amount of entrained air necessary for freeze-thaw resistance, and a mount of concret aggregates the achievement of the desied concrete design strength and a water-to-cement ratio concrete aware of accumate to design and construction of the components to prevent and multige the aging affects due to freeze-thaw (4) Detection of Aging Effects. Such and applying consistance, and are construction of the components to provent and multige the aging and construction of the components to process, and Administrative controls. Ste corrective	C3 ULTIMATE HEAT SINK		Further
Aging Management Program (AMP)       Evaluation and lecenneal basis       Evaluation         The AMP should consist of walkdowns       interacting, and spalling due to freeze-thav on the intended function of the components for managing the effects of freeze-thaw on the intended function of the further on the freeze-thaw resistance of the concrete prepared in accordance with ACI 318-63 or ACI 349-85, which requires an appropriate amount of entrained air and water-to-cement ratio for freeze-thaw resistance (NUERC-1557). The weather index is the product of the average annual number of freezing cycle days and the average annual winter rainfall as specified in ASTM C33-82. "Standard Specification of Concrete Agregates." Freeze-thaw is not significant for concrete structure components located in a geographic region of mild weathering coded ays - AS-557, (2) Preventive Actions (Consideration of freeze-thaw should be adequately at entrained lar concerts." of ACI 349-85. Section 4.5. "Special Exposure Requirements." of ACI 349-85 specifies that concrete prepared in accordance with AS-05. Concrete prepared in accordance with AS-05. Special Exposure Requirements." of ACI 349-85 specifies that concrete prepared in accordance with ACI 318-63 or ACI 349-85. Section 4.5. "Special Exposure Requirements." of ACI 349-85 for generating and (-3, -5, -5, -5, -5, -5, -5, -5, -5, -5, -5	Existing	Durtueties and Decksteric Pasia	Further
The AMP should consist of walkdows and negrections to detect scaling, eracking, and spalling due to freeze- thaw. Elements of the components for managing the effects onstruction of the components for managing the effects of freeze-thaw vestication of the concrete prepared in accordance with ACI 318-63 or ACI 349-85, which requires an appropriate amount of entrained air and water-to- ement ratio for freeze-thaw resistance of the concrete prepared in accordance with ACI 318-63 or ACI 349-85, which requires an appropriate amount of entrained air and water-to- ement ratio for freeze-thaw resistance for AST 339-85, and the segments of freeze-thaw resistance of the concrete prepared in accordance with ACI 318-63 or ACI 349-85, which requires an appropriate amount of entrained air and water-to- ement ratio for freeze-thaw resistance for AST 320-320, "Standard Specification for Concret Aggregates." Freeze-thaw is not significant for concret Aggregates." Freeze-thaw is not significant for concret expourter components located in a design odes ACI 349-65. Section 4.5. "Specification of Classes and ACI 349-65. Section 4.5. "Specification of acrotent 3.5-6% for moderate exposure and 4.5-7.5% for secret expoured and has a low water-to- cement ratio 0.450-0.5). Concrete prepared in accordance with ACI 318-63 or ACI 349-85 continas an appropriate amount of entrained air necessary for freeze-thaw resistance. and an amount of cement bat both enables the achievement of the desired concrete design strength and a water-to-cement ratio conducter to reduced permeability. ( <i>G) Perometres Monitored I ingeneted</i> : The program relies exclusively on the freeze-thaw resistance provided by ACI codes in design and construction of the components to prevent and mitigate the aging effects due to freeze-thaw. ( <i>H) Detection of Aging Effects</i> : Scaling and agailing could reduce the concret cover over the reinforcing steel and eventually expose the reinforcing steel to accleritie orrosion. The flat or near flat concrete surfaces are more susceptible	Aging Management Program (AMP)	Evaluation and Technical Basis	Evaluation Vee
and inspections to detect scaling, measures by using ACI codes in the design and source of the components for manging the effects of freeze-thaw on the intended function of the, should be further equinational section of the components for anging the effects of freeze-thaw resistance for the concrete prepared in accordance with ACI 318-63 or ACI 349-85, which requires an appropriate amount of entrained air and water-to- cement ratio for freeze-thaw resistance (NUERC-1557). The weather index is the product of the average annual number of freezing cycle days and the average annual number of freezing cycle days and the average annual winter rainfall as specified in ASTM C33-82. "Standard Specification for Concrete Agregates." Freeze-thaw is not significant for concrete structure components located in a geographic region of mild weathering conditions (weather index <100 day-inch/yr) (NUEC-1557). (2) Preventive Actions: Consideration of freeze-thaw is not significant for concrete Agregates." The event was not significant for concrete Agregates. The event was design codes ACI 318-63 and ACI 349-85. Section 4.5. "Special Exposure Requirements." ACI 349-86-55 specifies that concrete prepared in accordance with ACI 318-63 or ACI 349-85 contains an appropriate amount of entrained air necessary for freez-thaw resistance, and an amount of cement that both enables the achievement of the desired courcet design strength and a water-to-cement ratio conductive to reduced permeability. ( <i>3</i> ) <i>Parameters Monitored</i> 1 Mayeseted: The program relies exclusively on the freeze-thaw resistance provided by ACI codes in design and construction of the components to prevent and mitigate the aging effects due to freeze-thaw (4) <i>Detection of Aging Effects</i> . Scaling and spalling dout to freeze-thaw are not occurring. ( <i>5</i> ) <i>Monitoring and Trending</i> Fieldic Inspected to resure that significant scaling and spalling due to freeze-thaw are not occurring. ( <i>5</i> ) <i>Monitoring and Trending</i> Fieldic Inspectods provide data for trending. ( <i>6</i> ) Acceptanc	The AMP should consist of walkdowns	(1) Scope of Program: The program relies on the preventive	res,
<ul> <li>cracking, and spalling due to freeze- thaw.</li> <li>construction of the components located in a geographic error or moderate weathering conditions (weather index &gt;100 day-inch/yf). the program relies on the freeze-thaw resistance of the concrete prepared in accordance with ACI 318-63 or ACI 349-85, which requires an appropriate amount of entrained at rad water-to- cement ratio for freeze-thaw resistance (NUREG-1557). The weather index is the product of the average annual number of freezing cycle days and ACI 349-85. Section 4.5.</li> <li>"Special Exposure Requirements," of ACI 349-85 section 4.5.</li> <li>"Special Exposure Requirements," of ACI 349-85 section 4.5.</li> <li>"Special Exposure Requirements," for acret the average an appropriate anount of entrained at necessary for freeze-thaw resistance, and an amount of cement that both enables the achievement of the distic concrete design strength and a numer of entrained at necessary for freeze-thaw resistance, and an amount of cement that both enables the achievement of the distic concrete design strength and a water-to-cement ratio confluctive to reduced permeability.</li> <li>(<i>B</i>) <i>Parameters Monitored I mapeted</i>. The program relities exclusively on the freeze-thaw the asistance to prevent and mitigate the aging effects the accompany to the accordance with Appendix B to 10 centere that and eventually depose the reinforcing</li></ul>	and inspections to detect scaling.	measures by using ACI codes in the design and	Element 4
thaw. of freez-thaw on the intended iunction of the, components. For components located in a geographic region of severe or moderate weathering conditions (weather index >100 day-inch/yr), the program relies on the freez-thaw resistance Of the concrete prepared in accordance with ACI 318-63 or ACI 349-65, which requires an appropriate amount of entrained air and water-to- cement ratio for freez-thaw resistance (NURSEC-157). The weather index is the product of the average annual number of freezing cycle days and the average annual winter rainfall as specified in ASTM C33-62. "Standard Specification for Concrete Aggregates." Preze-thaw is not significant for concrete structure components located in a geographic region of mild weathering conditions (weather index <100 day-inch/yr) (NUEBC-1557). (2) Presentive Actions: Consideration of freez-thaw is not significant for concrete structure components located in a geographic region of mild weathering conditions (weather index <100 day-inch/yr) (NUEBC-1557). (2) Presentive Actions: Consideration of freez-thaw is required by design codes ACI 318-63 and ACI 349-65. Section 4.5. "Special Exposure Requirements." of ACI 349-65 sopeure and 4.5.7.56 for severe exposured in accordance with ACI 318-63 or ACI 340-65 contains an appropriate amount of entrained air necessary for freeze-thaw resistance, and an amount of cement that both enables the achievement of the desired concrete design strength and a water-to-cement ratio conducte to reduced permeability. (3) Parameters Monitored/ Inspected: The program relies exclusively on the freeze-thaw resistance (by ACI codes in design and construction of the components to prevent and mitigat the aging effects weat to recert to reclusively on the freeze-thaw resistance to freeze-thaw. (7) Corrective Actions, Confirmation Process, and Administrative controls are and accordance with Appendix B to 10 CFR Parts 50 requirements and will contine to be applicable for license renewal. (10) Operating Experien	cracking, and spalling due to freeze-	construction of the components for managing the effects	snouid be
components. For components located in a geographic region of severe or moderate weathering conditions (weather index >100 day-inch/yr). the program relies on the freez-thaw resistance of the concrete prepared in accordance with ACI 318-63 or ACI 349-65, which requires an appropriate amount of entrained ar and water-to- cement ratio for freeze-thaw resistance (NUREC-1557). The weather index is the product of the average annual winter minfall as specified in ASTM C33-62. "Standard Specification for Concrete Aggregates." Freeze-thaw is not significant for concrete structure components located in a geographic region of mild weathering conditions (weather index <100 day-inch/yr) (NUREC-1557). (2) Presentise Actions: Conscrete structure components located in a geographic region of mild weathering conditions (weather index <100 day-inch/yr) (NUREC-1557). (2) Presentise Actions: Conscrete structure components located in a geographic region of mild weathering conditions (weather index <100 day-inch/yr) (NUREC-1557). (2) Presentise that concrete exposure Requirements." of ACI 349-63 secilles that concrete exposure Requirements." of ACI 349-63 secilles that concrete exposure and has a low water-to- cement ratio (0.450-0.5). Concrete prepared in accordance with ACI 318-63 or ACI 349-65 contains an appropriate amount of entrained air necessary for freeze-thaw resistance, and an amount of concret the ables the achievement of the desired concrete design strength and a water-to-cement ratio conducive to reduced permeability. (3) Parameters Monitored/ Inspected: The program relies exclusively on the freeze-thaw resistance provided by ACI codes in design and construction of the components to prevent and milgate the aging effects water for cortosion. The flat or neer to use to freeze-thaw. (4) Detection of Aging Effects: Scaling and spalling could reduce the concret evare are not commutate to prevent weather are not commutate of a scaling and spalling due to freeze-thaw are not occurring. (5) Monitoring and Trending: Periodic ins	thaw.	of freeze-thaw on the intended function of the	rurther
region of severe or moderate weathering continuous (veather index > 100 day-inch/yr), the program relies on the freeze-thaw resistance (NUREG-1557). The weather index is the product of the average annual number of freeze-thaw resistance (NUREG-1557). The weather index is the product of the average annual winter rainfall as specified in ASTM C33-82. "Standard Specification for Concrete Aggregates." Freeze-thaw is not significant for concrete structure components located in a geographic region of mild weathering conditions (weather index <100 day-inch/yr) (NUREG-1557). (2) Presentive Actions: Consideration of freeze-thaw is required by design codes ACI 318-63 and ACI 349-65. Section 4.5. "Specification for freeze-thaw should be adequately at entrained (air content 3.5-6%) for moderate exposure and 4.5.7.3% for severe exposure) and has a low water-to- cement ratio (0.45-0.5). Concrete prepared in accordance with ACI 318-66 or ACI 349-85 contains an appropriate amount of entrained air necessary for freeze-thaw resistance, and an amount of cement that both enables the achievement of the desired concrete design strength and a water-to-cement ratio conductive to reduced permeability. (3) Parameters Monitored Inspected: The program relies exclusively on the freeze-thaw resistance, and an amount of on the flat oncrete design strength and a water-to-cement ratio conductive to reduced permeability. (4) Detection of Aging Effects: Scaling and spalling could reduce the concrete cover over the reinforcing steel and eventually expose the reinforcing steel to accelerated corrosion. The flat on near that concrete surfaces are more succeptible to freeze-thaw because of accumulation and saturation. Concrete surfaces are more flat and spalling out on the surface streaments to prevent and the inspected to ensure that significent scaling and spalling due to freeze-thaw are not occuming (6) Monitoring and Trending: Periodic Inspections provide data for tending. (6) Acceptance Crientian The contons should be inspected to ensure that s		components. For components located in a geographic	evaluated.
(weather index >100 day-inch/yr). the propared in the freeze-thaw resistance of the concrete propared in accordance with ACI 318-63 or ACI 349-85, which requires an appropriate amount of entrained air and water-to- cement ratio for freeze-thaw resistance [NUREC-1557]. The weather index is the product of the average annual number of freezing cycle days and the average annual winter rainfall as specified in ASTM C33-82, "Standard Specification for Concrete Aggregates." Freeze-thaw is not significant for concrete structure components located in a geographic region of mild weathering conditions (weather index <100 day-inch/yr) (NUREC-1557), (2) Preventive Actions: Consideration of freeze-thaw is required by design codes ACI 318-63 and ACI 349-85. Sectiles that concrete exposed to freeze-thaw should be adequately air entrained (air content 3.5-6%) for moderate exposure and 4.5-7.5% for severe exposure) and has a low water-to- cement ratio (0.45-0.5). Concrete prepared in accordance with ACI 318-63 or ACI 349-85 contains an appropriate amount of entrained air necessary for freeze-thaw resistance, and an amount of cement that both enables the achievement of the desire downer to due day appropriate and the sign and construction of the components to prevent and mitigate the aging effects. Scaling and spaling could reduce the onceret cover over the reinforting steel and eventually expose the reinforting steel oncrete mix design should meet the air content (entrained air 3- 6%) and water-to-cement stat (0.60-60-50) requirements of ACI 318-63 or ACI 340-		region of severe or moderate weathering conditions	
the freeze-thaw resistance of the concluse of equires an appropriate amount of entrained air and water-to- cement ratio for freeze-thaw resistance fNUREC-1557). The weather index is the product of the average annual number of freezing cycle days and the average annual winter rainfall as specified in ASIM C33-82. "Standard Specification for Concrete Aggregates." Freeze-thaw is not significant for concrete structure components located in a geographic region of mild weathering conditions (weather index x100 day-inch/yr) fNUREC-1557). (2) Preventive Actions: Consideration of freeze-thaw is required by design code sACI 318-83 and ACI 349-83. Section 4.5. "Special Exposure Requirements." of ACI 349-85 specifies that concrete exposed to freeze-thaw should be adequately air entrained (air content 3.5-8% for moderate exposure and 4.5-7.5% for severe exposure) and has a low water-to- cement ratio (0.45-0.5). Concrete prepared in accordance with ACI 318-83 or ACI 349-85 contians an appropriate amount of entrained air necessary for freeze-thaw resistance, and an amount of coment that both enables the achievement of the desired concrete design strength and a water-to-cement ratio conductive to reduced permeability. (3) Parameters Monitored/Inspected: The program rules exclusively on the freeze-thaw resistance provided by ACI codes in design and construction of the components to prevent and mitigate the aging effects due to freeze-thaw. (4) Detection of Aging Biffects's Scaling and spalling could reduce the concrete cover over the reinforming steel and eventually expose the reinforming steel and eventually to the freeze-thaw are not courting. (6) Monitoring and Trending: Periodic Inspections provide data for trending. (6) Acceptance Criteria: The concrete mix design should meet the air content (entrained air 3- 6%) and water-to-cement ratio (0.45-0.5) requirements of ACI 318-63 or ACI 349-68 for providing the resistance to freeze-thaw. (7) 90 perioding Experience: Scaling, eracking, and spalling on concrete surfaces due to f		(weather index >100 day-inch/yr). the program relies on	
accordance with ACI 316-65 and ACI 348-65. an appropriate amount of of entrained air and water-to- cement ratio for freeze-thaw resistance (NUREC-1557). The weather index is the product of the average annual number of freezing cycle days and the average annual winter rainfall as specified in ASTM C33-82. "Standard Specification for Concrete Aggregates." Freeze-thaw is not significant for concrete structure components located in a geographic region of mild weathering conditions (weather index <100 day-inch/yr) (NUREC-1557). (2) Freemitive Actions: Consideration of freeze-thaw is required by design codes ACI 318-63 and ACI 349-85. Sectifies that concrete exposed to freeze-thaw should be adequately air entrained (air content 3.5-6%) for moderate exposure and 4.5-7.5% for severe exposure) and has a low water-to- cement ratio (0.45-0.5). Concrete prepared in accordance with ACI 348-85 or ACI 349-85 contains an appropriate amount of entrained air necessary for freeze-thaw resistance. and an amount of cement that both enables the achievement of the desired concrete design strength and a water-to-cement ratio conductive to reduced permeability. ( <i>g</i> ) Parameters Monitored/ Inspected: The program relies exclusively on the freeze-thaw resistance provided by ACI codes in design and construction of the components to prevent and mitigate the aging effects use to freeze-thaw. ( <i>d</i> ) Detection of Aging Effects. Scaling and spalling could reduce the concrete cover over the reinforting steel and eventually expose the reinforting steel and eventually expose the reinforting steel and stantation. Concrete surfaces at susceptible locations should be inspected to ensure that significant scaling and spalling due to freeze-thaw resistance to freeze-thaw. ( <i>d</i> ) 318-63 or ACI 349-85 for providing the resistance to freeze-thaw. ( <i>r</i> ) 90 / 60 / 60 / 60 / 60 / 60 / 60 / 60 /	· · · · · · · · · · · · · · · · · · ·	the freeze-thaw resistance of the concrete prepared in	
an appropriate another to the intervalue and the two to cement ratio for freeze-thaw resistance (NUREC-1557). The weather index is the product of the average annual number of freezing cycle days and the average annual winter rainfall as specified in ASTM C33-82. "Standard Specification for Concrete Aggregates." Freeze-thaw is not significant for concrete artecture components located in a geographic region of multi weathering conditions (weather index <100 day-inch/yr) (NUREC-1557). (2) Preventive Actions: Consideration of freeze-thaw is required by design codes ACI 316-83 and ACI 349-85. Section 4.5. "Special Exposure Requirements." of ACI 348-85 specifies that concrete exposed to freeze-thaw whould be adequately air entrained (air content 3.5-6% for moderate exposure) and that a low water-to-cement ratio (0.45-0.5). Concrete prepared in accordance with ACI 316-63 or ACI 349-65 or ACI		accordance with ACI 318-05 of ACI 349-05, which requires	
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number of freezing cycle days and the average annual winter rainfall as specified in ASTM C33-62. "Standard Specification for Concrete Aggregates." Freeze-thaw is not significant for concrete structure components located in a geographic region of mid weathering conditions (weather index <100 day-inch/yr) (NIREC-1557). (2) Preventive Actions: Consideration of freeze-thaw is required by design codes ACI 314-863 and ACI 349-85. Section 4.5. "Special Exposure Requirements." of ACI 349-85 specifies that concrete exposed to freeze-thaw should be adequately air entrained (air content 3.5-6% for moderate exposure and 4.5-7.5% for severe exposure) and has a low water-to- cement ratio (0.45-0.5). Concrete prepared in accordance with ACI 318-63 or ACI 349-85 contains an appropriate amount of entrained air necessary for freeze-thaw resistance, and an amount of cement that both enables the achievement of the desired concrete design strength and a water-to-cement ratio conducive to reduced permeability. (3) Parameters Monitored/ Inspected: The program reles exclusively on the freeze-thaw resistance provided by ACI codes in design and construction of the components to prevent and mitigate the aging effects due to freeze-thaw. (4) Detection of Aging Effects: Scaling and spalling could reduce the concrete cover over the reinforcing steel and eventually expose the reinforcing steel and eventually expose the reinforcing steel and eventually expose the reinforcing isseel and eventually expose the reinforcing isseel and saturation. Concrete surfaces at susceptible locations should be inspected to ensure that significant scaling and spalling due to freeze-thaw are not occurring. (5) Monitoring and Trending: Periodic inspections provide data for trending. (6) Acceptance Criteria: The concrete mix design should meet the aft content (entrained air 3- 6%) and water-to-cement ratio (0.45-0.5) requirements of ACI 318-63 or ACI 349-85 for providing the resistance to freeze-thaw. (7:9) Operating Experience: Staling, eracking, and spalling o		The weather index is the product of the average annual	
winter rainfall as specified in ASTM C33-82. "Standard Specification for Concrete Aggregates." Freze-thaw is not significant for concrete structure components located in a geographic region of mild weathering conditions (weather index 100 day-inch/yn (NUREC-1557). (2) Preventive Actions: Consideration of freze-thaw is required by design codes ACI 318-63 and ACI 349-85. Section 4.5. "Special Exposure Requirements." of ACI 349-85 specifies that concrete exposed to freze-thaw should be adequately air entrained (air content 3.5-6% for moderate exposure and 4.5-7.5% for severe exposure) and has a low water-to- eement ratio (0.45-0.5). Concrete prepared in accordance with ACI 318-63 or ACI 349-85 contains an appropriate amount of entrained air necessary for freze-thaw resistance, and an amount of cement that both enables the achievement of the desired concrete design strength and a water-to-cement ratio conducive to reduced permeability. (3) Parameters Monitored/ Inspected: The program relies exclusively on the freze-thaw resistance provided by ACI codes in design and construction of the components to prevent and mitigate the aging effects due to freze-thaw. (4) Detection of Aging Effects: Scaling and spalling could reduce the concrete surfaces at susceptible locations should be inspected to ensure that significant scaling and spalling due to freze-thaw resistance provided by ACI corresion. The flat or near flat concrete surfaces are more susceptible to freze-thaw because of accumulation and saturation. Concrete surfaces af susceptible locations should be inspected to ensure that significant scaling and spalling due to freze-thaw are not occurring. (5) Monitoring and Trending: Periodic inspections provide data for trending. (6) Acceptance Criteria: The concrete mix design should meet the air content is significant scaling and spalling due to freze-thaw to accuse of accumulation and saturation. Concreting Actions, Confirmation Process, and Administrative controls as the ordew ad approval process, and administrative co		The weather index is the product of the average annual	
Specification for Concrete Agregates." Freeze-thaw is not significant for concrete structure components located in a geographic region of mild weathering conditions (weather index <100 day-inch/yri) (NUREG-1557.) (2) Freventive Actions: Consideration of freeze-thaw is required by design codes ACI 318-63 and ACI 349-85. Section 4.5. "Special Exposure Requirements." of ACI 349-85 specifies that concrete exposure and has a low water-to- cement ratio (0.45-0.5). Concrete prepared in accordance with ACI 318-63 contains an appropriate amount of entrained air necessary for freeze-thaw resistance, and an amount of cement that both enables the achievement of the desired concrete design strength and a water-to-cement ratio conducive to reduced permeability. (3) Parameters Monitored/ Inspected: The program relies exclusively on the freeze-thaw resistance provided by ACI codes in design and construction of the components to prevent and mitigate the aging effects due to freeze-thaw. (4) Detection of Aging Effects: Scaling and spalling could reduce the concrete cover over the reinforcing steel and eventually expose the reinforcing steel to accelerated corrosion. The flat or near flat concrete surfaces are more susceptible to freeze-thaw are not occuming. (5) Monitoring and Trending. Periodic inspections provide data for trending. (6) Acceptance Criticar: The concrete mix design should neet the at is significant scaling and spalling due to freeze-thaw are not occuming. (6) Monitoring and Trending. Periodic inspections provide data for trending. (6) Acceptance Criticar: The concrete mix design should neet the at content (entrained at 3- 600) and water-to-cement ratio (0.45-0.5) requirements of ACI 318-63 or ACI 349-85 for providing the resistance to freeze-thaw. (7.7) Overetive Actions. Confirmation Process, and Administrative controls. Site corrective actions program. QA procedures, site review and approval process, and administrative controls are implemented in accordance with Appendix B to 10 CFR Part 50 requirements and wi		minuter minfall as specified in ASTM C33-82. "Standard	
significant for concrete structure components located in a geographic region of mild weathering conditions (weather index <100 day-inch/yr) (NUREC-1557). (2) Preventive Actions: Consideration of freeze-thaw is required by design codes ACI 318-63 and ACI 349-85. Section 4.5. "Special Exposure Requirements." of ACI 349-85 specifies that concrete exposed to freeze-thaw should be adequately air entrained (air content 3.5-6% for moderate exposure and 4.5-7.5% for severe exposure) and has a low water-to- cement ratio (0.45-0.5). Concrete prepared in accordance with ACI 318-63 or ACI 349-85 contains an appropriate amount of entrained air necessary for freeze-thaw resistance, and an amount of cement that both enables the achievement of the desired concrete design strength and a water-to-cement ratio conductive to reduced permeability. (3) Parameters Monitored/ Inspected: The program relies exclusively on the freeze-thaw resistance provided by ACI codes in design and construction of the components to prevent and mitigate the aging effects due to freeze-thaw. (4) Detection of Aging Effects: Scaling and spalling could reduce the concrete cover over the reinforcing steel and eventually expose the reinforcing steel to accelerated corrosion. The flat or near flat concret surfaces are more susceptible to freeze-thaw because of accumulation and saturation. Concrete surfaces at susceptible locations should be inspected to ensure that significant scaling and spalling due to freeze-thaw are not occurring. (5) Monitoring and Trending: Periodic inspections provide data for trending. (6) Acceptance Criterin: The concrete mix design should meet the air content (entrained air 3- 6%) and water-to-cement ratio (0.45-0.5) requirements of ACI 318-63 or ACI 349-85 for providing the resistance to freeze-thaw. (7-9) Corrective Actions, Confirmation Process, and Administrative Controls: Site corrective actions program. QA procedures, site review and approval process, and administrative controls are implemented in accordance with Appendix B to		Specification for Concrete Aggregates." Freeze-thaw is not	
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(4) Detection of Aging Effects: Scaling and spalling could reduce the concrete cover over the reinforcing steel and eventually expose the reinforcing steel to accelerated corrosion. The flat or near flat concrete surfaces are more susceptible to freeze-thaw because of accumulation and saturation. Concrete surfaces at susceptible locations should be inspected to ensure that significant scaling and spalling due to freeze-thaw are not occurring. (5) Monitoring and Trending: Periodic inspections provide data for trending. (6) Acceptance Criteria: The concrete mix design should meet the air content (entrained air 3- 6%) and water-to-cement ratio (0.45-0.5) requirements of ACI 318-63 or ACI 349-85 for providing the resistance to freeze-thaw. (7-9) Corrective Actions, Confirmation Process, and Administrative Controls: Site corrective actions program, QA procedures, site review and approval process, and administrative controls are implemented in accordance with Appendix B to 10 CFR Part 50 requirements and will continue to be applicable for license renewal. (10) Operating Experience: Scaling, cracking, and spalling on concrete components located in severe weather conditions.		codes in design and construction of the components to	
(4) Detection of Aging Effects: Scaling and spaling could reduce the concrete cover over the reinforcing steel and eventually expose the reinforcing steel to accelerated corrosion. The flat or near flat concrete surfaces are more susceptible to freeze-thaw because of accumulation and saturation. Concrete surfaces at susceptible locations should be inspected to ensure that significant scaling and spalling due to freeze-thaw are not occurring. (5) Monitoring and Trending: Periodic inspections provide data for trending. (6) Acceptance Criteria: The concrete mix design should meet the air content (entrained air 3- 6%) and water-to-cement ratio (0.45-0.5) requirements of ACI 318-63 or ACI 349-85 for providing the resistance to freeze-thaw. (7-9) Corrective Actions, Confirmation Process, and Administrative Controls: Site corrective actions program. QA procedures, site review and approval process, and administrative controls are implemented in accordance with Appendix B to 10 CFR Part 50 requirements and will continue to be applicable for license renewal. (10) Operating Experience: Scaling, cracking, and spalling on concrete surfaces due to freeze- thaw has occurred for concrete components located in severe weather conditions.		prevent and mitigate the aging effects due to freeze-thaw.	
reduce the concrete cover the relationing steel and eventually expose the reinforcing steel to accelerated corrosion. The flat or near flat concrete surfaces are more susceptible to freeze-thaw because of accumulation and saturation. Concrete surfaces at susceptible locations should be inspected to ensure that significant scaling and spalling due to freeze-thaw are not occurring. (5) <i>Monitoring and Trending:</i> Periodic inspections provide data for trending. (6) Acceptance Criteria: The concrete mix design should meet the air content (entrained air 3- 6%) and water-to-cement ratio (0.45-0.5) requirements of ACI 318-63 or ACI 349-85 for providing the resistance to freeze-thaw. (7-9) Corrective Actions, Confirmation <b>Process, and Administrative Controls:</b> Site corrective actions program, QA procedures, site review and approval process, and administrative controls are implemented in accordance with Appendix B to 10 CFR Part 50 requirements and will continue to be applicable for license renewal. (10) Operating Experience: Scaling, cracking, and spalling on concrete surfaces due to freeze- thaw has occurred for concrete components located in severe weather conditions.		(4) Detection of Aging Effects: Scaling and spalling could	
corrosion. The flat or near flat concrete surfaces are more susceptible to freeze-thaw because of accumulation and saturation. Concrete surfaces at susceptible locations should be inspected to ensure that significant scaling and spalling due to freeze-thaw are not occurring. (5) Monitoring and Trending: Periodic inspections provide data for trending. (6) Acceptance Criteria: The concrete mix design should meet the air content (entrained air 3- 6%) and water-to-cement ratio (0.45-0.5) requirements of ACI 318-63 or ACI 349-85 for providing the resistance to freeze-thaw. (7-9) Corrective Actions, Confirmation Process, and Administrative Controls: Site corrective actions program, QA procedures, site review and approval process, and administrative controls are implemented in accordance with Appendix B to 10 CFR Part 50 requirements and will continue to be applicable for license renewal. (10) Operating Experience: Scaling, cracking, and spalling on concrete surfaces due to freeze- thaw has occurred for concrete components located in severe weather conditions.		require the concrete cover over the reinforcing steel to accelerated	
corrostor. The lat of their har content of accumulation and susceptible to freeze-thaw because of accumulation and saturation. Concrete surfaces at susceptible locations should be inspected to ensure that significant scaling and spalling due to freeze-thaw are not occurring. (5) Monitoring and Trending: Periodic inspections provide data for trending. (6) Acceptance Criteria: The concrete mix design should meet the air content (entrained air 3- 6%) and water-to-cement ratio (0.45-0.5) requirements of ACI 318-63 or ACI 349-85 for providing the resistance to freeze-thaw. (7-9) Corrective Actions, Confirmation Process, and Administrative Controls: Site corrective actions program, QA procedures, site review and approval process, and administrative controls are implemented in accordance with Appendix B to 10 CFR Part 50 requirements and will continue to be applicable for license renewal. (10) Operating Experience: Scaling, cracking, and spalling on concrete surfaces due to freeze- thaw has occurred for concrete components located in severe weather conditions.		eventually expose the removing sizer to accordiated	
saturation. Concrete surfaces at susceptible locations should be inspected to ensure that significant scaling and spalling due to freeze-thaw are not occurring. (5) Monitoring and Trending: Periodic inspections provide data for trending. (6) Acceptance Criteria: The concrete mix design should meet the air content (entrained air 3- 6%) and water-to-cement ratio (0.45-0.5) requirements of ACI 318-63 or ACI 349-85 for providing the resistance to freeze-thaw. (7-9) Corrective Actions, Confirmation Process, and Administrative Controls: Site corrective actions program, QA procedures, site review and approval process, and administrative controls are implemented in accordance with Appendix B to 10 CFR Part 50 requirements and will continue to be applicable for license renewal. (10) Operating Experience: Scaling, cracking, and spalling on concrete surfaces due to freeze- thaw has occurred for concrete components located in severe weather conditions.	· ·	suscentible to freeze-thaw because of accumulation and	
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Monitoring and Trending: Periodic inspections provide data for trending. (6) Acceptance Criteria: The concrete mix design should meet the air content (entrained air 3- 6%) and water-to-cement ratio (0.45-0.5) requirements of ACI 318-63 or ACI 349-85 for providing the resistance to freeze-thaw. (7-9) Corrective Actions, Confirmation Process, and Administrative Controls: Site corrective actions program, QA procedures, site review and approval process, and administrative controls are implemented in accordance with Appendix B to 10 CFR Part 50 requirements and will continue to be applicable for license renewal. (10) Operating Experience: Scaling, cracking, and spalling on concrete surfaces due to freeze- thaw has occurred for concrete components located in severe weather conditions.		spalling due to freeze-thaw are not occurring. (5)	
data for trending. (6) Acceptance Criteria: The concrete mix design should meet the air content (entrained air 3- 6%) and water-to-cement ratio (0.45-0.5) requirements of ACI 318-63 or ACI 349-85 for providing the resistance to freeze-thaw. (7-9) Corrective Actions, Confirmation Process, and Administrative Controls: Site corrective actions program, QA procedures, site review and approval process, and administrative controls are implemented in accordance with Appendix B to 10 CFR Part 50 requirements and will continue to be applicable for license renewal. (10) Operating Experience: Scaling, cracking, and spalling on concrete surfaces due to freeze- thaw has occurred for concrete components located in severe weather conditions.	1	Monitoring and Trending: Periodic inspections provide	1
mix design should meet the air content (entrained air 3- 6%) and water-to-cement ratio (0.45-0.5) requirements of ACI 318-63 or ACI 349-85 for providing the resistance to freeze-thaw. (7-9) Corrective Actions, Confirmation Process, and Administrative Controls: Site corrective actions program, QA procedures, site review and approval process, and administrative controls are implemented in accordance with Appendix B to 10 CFR Part 50 requirements and will continue to be applicable for license renewal. (10) Operating Experience: Scaling, cracking, and spalling on concrete surfaces due to freeze- thaw has occurred for concrete components located in severe weather conditions.		data for trending. (6) Acceptance Criteria: The concrete	
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ACI 318-63 or ACI 349-85 for providing the resistance to freeze-thaw. (7-9) Corrective Actions, Confirmation Process, and Administrative Controls: Site corrective actions program, QA procedures, site review and approval process, and administrative controls are implemented in accordance with Appendix B to 10 CFR Part 50 requirements and will continue to be applicable for license renewal. (10) Operating Experience: Scaling, cracking, and spalling on concrete surfaces due to freeze- thaw has occurred for concrete components located in severe weather conditions.		6%) and water-to-cement ratio (0.45-0.5) requirements of	
freeze-thaw. (7-9) Corrective Actions, Confirmation Process, and Administrative Controls: Site corrective actions program, QA procedures, site review and approval process, and administrative controls are implemented in accordance with Appendix B to 10 CFR Part 50 requirements and will continue to be applicable for license renewal. (10) Operating Experience: Scaling, cracking, and spalling on concrete surfaces due to freeze- thaw has occurred for concrete components located in severe weather conditions.		ACI 318-63 or ACI 349-85 for providing the resistance to	1
<b>Process, and Administrative Controls:</b> Site corrective actions program, QA procedures, site review and approval process, and administrative controls are implemented in accordance with Appendix B to 10 CFR Part 50 requirements and will continue to be applicable for license renewal. (10) Operating Experience: Scaling, cracking, and spalling on concrete surfaces due to freeze- thaw has occurred for concrete components located in severe weather conditions.		freeze-thaw. (7-9) Corrective Actions, Confirmation	1
actions program, QA procedures, site review and approval process, and administrative controls are implemented in accordance with Appendix B to 10 CFR Part 50 requirements and will continue to be applicable for license renewal. (10) Operating Experience: Scaling, cracking, and spalling on concrete surfaces due to freeze- thaw has occurred for concrete components located in severe weather conditions.		Process, and Administrative Controls: Site corrective	
process, and administrative controls are implemented in accordance with Appendix B to 10 CFR Part 50 requirements and will continue to be applicable for license renewal. (10) Operating Experience: Scaling, cracking, and spalling on concrete surfaces due to freeze- thaw has occurred for concrete components located in severe weather conditions.		actions program, QA procedures, site review and approval	1
accordance with Appendix B to 10 CFR Part 50 requirements and will continue to be applicable for license renewal. (10) Operating Experience: Scaling, cracking, and spalling on concrete surfaces due to freeze- thaw has occurred for concrete components located in severe weather conditions.		process, and administrative controls are implemented in	· ·
requirements and will continue to be applicable for license renewal. (10) Operating Experience: Scaling, cracking, and spalling on concrete surfaces due to freeze- thaw has occurred for concrete components located in severe weather conditions.		accordance with Appendix B to 10 CFR Part 50	1
license renewal. (10) Operating Experience: Scaling, cracking, and spalling on concrete surfaces due to freeze- thaw has occurred for concrete components located in severe weather conditions.		requirements and will continue to be applicable for	
cracking, and spalling on concrete surfaces due to treeze- thaw has occurred for concrete components located in severe weather conditions.		license renewal. (10) Operating Experience: Scaling.	
thaw has occurred for concrete components located in severe weather conditions.		cracking, and spalling on concrete surfaces due to freeze-	
severe weather conditions.		thaw has occurred for concrete components located in	1
		severe weather conditions.	<u></u>

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1.	Structure and	Region of		Environ-	Aging	Aging	
Item	Component	Interest	Material	ment	Ellect	Mechanism	References
Item C3.1.1 thru C3.1.3	Structure and Component Cooling Tower	Region of Interest Foundation, Exterior Concrete Above Grade, and Exterior Concrete Below Grade	Material Reinforced Concrete	Environ- ment Above Grade: Outdoors Ambient Conditions: Below Grade, and Foundation : Soil and Ground Water	Aging Effect Cracking, Spalling, Loss of Bond, and Loss of Material	Aging Mechanism Corrosion of Embedded Steel and Rebar	References NRC Regulatory Guide 1.127.

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Evicting		Further
Aging Management Program (AMP)	Evaluation and Technical Basis	Evaluation
Aging Management Program (AMP) The AMP, based on guidelines of NRC Regulatory Guide 1.127. "Inspection of Water-Control Structures Associated with Nuclear Power Plant." relies on inspections for all water passages, conduits, sluices, and other concrete surfaces subject to running water for erosion, corrosion, abrasion, cavitation, obstruction, leakage, and cracks at periodic intervals not to exceed 5 years. When significant degradation is found, Regulatory Guide 1.127 recommends that an evaluation should be performed to assess the deterioration and continuing serviceability and to provide appropriate mitigating measures.	(1) Scope of Program: The program is focused on managing the effects of concrete cracking, spalling, and loss of bond due to corrosion of embedded steel and rebar on the intended function of the components. (2) Preventive Actions: Regulatory Guide 1.127 recommends inspections of conditions of concrete surfaces, structural cracking, settlement, and water passage at periodic intervals not to exceed 5 years, and compilation of the engineering data. Other recommendations include examination of cooling water channels and canals for channel bank erosion, bed aggravation or degradation and siltation, and examination for any conditions that may impose operational constraints. When significant degradation is found, Regulatory Guide 1.127 recommends that an evaluation should be performed to assess the deterioration and continuing serviceability and to provide the appropriate mitigating measures. (3) Parameters Monitored/Inspected: The parameters inspected are the conditions of the concrete surfaces for signs of concrete cracking, spalling, and loss of bond due to corrosion of embedded steel and rebar. (4) Detection of Aging Effects: Regulatory Guide 1.127 recommends inspection of water- control structures at periodic intervals not to exceed 5 years and includes engineering data compilation, inspection, and evaluation of results. The engineering data compilation consists of collecting and evaluating: (1) general project data (including as-built photographs of concrete surfaces), (2) concrete properties (including the source and type of aggregate, cement used, mix design data, and test results during construction, and evaluation of concrete surfaces, structural cracking, settlement and water passage. Regulatory Guide 1.127 also recommends comparison of previous and present conditions by photographs, and documentation of new or progressive problems and inspection results. When significant changes occur, an evaluation is specified to assess the deterioration mad continuing serviceability and to provide appropriate mitigating	Yes. Element 4 should be further evaluated.

Item	Structure and Component	Region of Interest	Material	Environ- ment	Aging Effect	Aging Mechanism	References
						-	
C3.1.1 thru C3.1.3	Cooling Tower	Foundation, Exterior Concrete Above Grade, and Exterior Concrete Below Grade	Reinforced Concrete	Above Grade: Outdoors Ambient Conditions; Below Grade, and Foundation : Soil and Ground Water	Increase of Porosity and Permeabi- lity, Cracking, and Spalling	Leaching	NUREG-1557. ACI Standard 201.2R-67.

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СЗ ULTIMATE HEAT SINK Existing Evaluation and Technical Basis Aging Management Program (AMP) (continued from previous page) inaccessibility, the effects of corrosion of embedded steel and rebar on foundation and below grade exterior concrete surfaces should be dealt with on a case-by-case basis (NUREG-1557). (5) Monitoring and Trending: Periodic

	Inspection of conditions of concrete surfaces at interval not to exceed 5 years and engineering data compilation should provide data for trending. (6) Acceptance Criteria: No unacceptable visual indication of concrete cracking, spalling, and loss of bond due to corrosion of embedded steel and rebar. (7-9) Corrective Actions, Confirmation Process, and Administrative Controls: Site corrective actions program. QA procedures, site review and approval process, and administrative controls are implemented in accordance with Appendix B to 10 CFR Part 50 requirements and will continue to be applicable for license renewal. (10) Operating Experience: Cracking, spalling, loss of bond, and loss of material caused by corrosion of embedded steel and rebar have occurred. when the component is exposed to aggressive environment (pH <11.5 or chlorides >500 ppm) for a sustained period. Structure components exposed to flowing water with high chlorides have experienced corrosion of rebar. Corrosion related problems have also occurred in concrete cooling tower exposed to flowing water with high sulfate or chloride content.	
The program relies on the preventive measure by using ACI standard ACI 201.2R-67 in design and construction of the component for managing the effects of leaching on the intended function of the component (NUREG-1557). Increase of porosity and permeability due to leaching of calcium hydroxide is non-significant if the components are not exposed to flowing water; or if exposed to flowing water; are constructed using the guidance of ACI 201.2R-67 to ensure dense, well-cured concrete with low permeability and control cracking through proper arrangement and distribution of reinforcement (NUREG-1557).	(1) Scope of Program: The program relies on the preventive measure by using ACI standard 201.2R-67 in design and construction of the component for managing the effects of leaching on the intended function of the component. (2) <b>Preventive Actions:</b> To cause leaching, the water must be flowing, rather than just filling a crack or voids. Concrete structures prepared in accordance with ACI 201.2R-67 should ensure dense, well-cured concrete and control cracking through proper arrangement and distribution of reinforcement, and an amount of cement that both enables the achievement of the desired concrete design strength and a water-to-cement ratio conducive to reduced permeability necessary for leaching resistance. (3) <b>Parameters Monitored/Inspected:</b> The program relies exclusively on the leaching resistance provided by ACI standards in design and construction of the concrete is exposed to flowing water such as rain or melting snow, increase of porosity and permeability and loss of strength can occur due to leaching of calcium hydroxide from contrete paste. Cracks and improperly prepared construction joints are potential areas for leaching. Concrete surfaces at susceptible locations should be inspected to ensure that significant cracking and spalling due to leaching are not occurring. (5) Monitoring and Trending: Periodic inspection provides data for trending. (6) Acceptance Criteria: ACI 201.2R-67 specifies concrete the air content (entrained air 3-6%) and	Yes, Element 4 should be further evaluated.

Further

Evaluation

### VII AUXILIARY SYSTEMS C3. ULTIMATE HEAT SI

(	C3. ULTIMAT	E HEAT SINK					
	Structure and	Region of		Environ-	Aging	Aging	
Item	Component	Interest	Material	ment	Effect	Mechanism	References
						-	
C3.1.1 thru C3.1.3	Cooling Tower	Foundation, Exterior Concrete Above Grade, and Exterior Concrete Below Grade	Reinforced Concrete	Exterior Concrete Above Grade: Outdoors Ambient Conditions Exterior Concrete Below Grade, and Foundation : Soil and Ground Water	Increase of Porosity and Permeabi- lity. Cracking, and Spalling	Aggressive Chemical Attack	NRC Regulatory Guide 1.127

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C3 ULTIMATE HEAT SINK		
Existing Aging Management Program (AMP)	Evaluation and Technical Basis	Further Evaluation
	(Continued from previous page) water-to-cement ratio (0.45 ~ 0.5) of concrete mixture to ensure dense, well-cured concrete with low permeability and control cracking through proper arrangement and distribution of reinforcement. (7-9) Corrective Actions, Confirmation Process, and Administrative Controls: Site corrective actions program. QA procedures, site review and approval process, and administrative controls are implemented in accordance with Appendix B to 10 CFR Part 50 requirements and will continue to be applicable for license renewal. (10) Operating Experience: Concrete cracking and leaching have been observed in auxiliary building, control building, fuel building, and service water pump room (NUREG-1552).	
The AMP, based on guidelines of NRC Regulatory Guide 1.127. "Inspection of Water-Control Structures Associated with Nuclear Power Plant" relies on periodic inspections for all water passages, conduits, sluices, and other concrete surfaces subjects to running water for erosion, corrosion, abrasion, cavitation .obstruction, leakage, and cracks at periodic intervals not to exceed 5 years. When significant degradation is found, Regulatory Guide 1.127 recommends that an evaluation is performed to assess the deterioration and continuing serviceability and to provide the appropriate mitigating measures.	(1) Scope of Program: The program is focused on managing the effects of increase of porosity and permeability, cracking and spalling due to aggressive chemical attack on the intended function of the component. (2) Preventive Actions: Regulatory Guide 1.127 recommends inspections of conditions of concrete surfaces, structural cracking, settlement, and water passage at periodic intervals not to exceed 5 years, and includes engineering data compilation. Other recommendations include examination of cooling water channels and canals for channel bank erosion, bed aggravation or degradation and siltation and examination for any conditions that may impose operational constraints. When significant degradation is found, Regulatory Guide 1.127 recommends that an evaluation is performed to assess the deterioration and continuing serviceability and to provide the appropriate mitigating measures. (3) Parameters Monitored/ Inspected: The parameters inspected are the conditions of the concrete surfaces for signs of concrete cracking, spalling, and loss of bond due to aggressive chemical attack. (4) Detection of Aging Effects: Regulatory Guide 1.127, "Inspection of Water-Control Structures Associated with Nuclear Power Plant. <sup>n(5)</sup> recommends inspection of water-control structures to detect evidence of leakage, cracking, seepage, significant post-construction changes, and deterioration of concrete surfaces and to verify the adequacy and quality of maintenance and operating procedures at periodic intervals not to exceed 5 years. Regulatory Guide 1.127 also recommends comparison of previous and present conditions by photographs, and documentation of new or progressive problems and inspection results. When significant changes occur, an evaluation is recommended to assess the deterioration and continuing serviceability and to provide appropriate mitigating measures. Regulatory Guide 1.127 also recommends engineering data compilation of concrete properties, including the source and type of aggregate, cement used, mix design data, te	Yes, Element 4 should be further evaluated.

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	Structure and	Region of		Environ-	Aging	Aging	Deferences
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C3.1.5	Cooling Tower	Masonry	Masonry	Air	Cracking of	Restrain	NRC IEB 80-11.
		Block Wall	1		Masonry	Shrinkage,	NRC IN 87-67.
			1		Block Walls	Creep, and	
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						Environ-	
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C3 ULTIMATE HEAT SINK		
Existing		Further
Aging Management Program (AMP)	Evaluation and Technical Basis	Evaluation
	(continued from previous page)	
	detect cracking and spalling of concrete surfaces caused by	
	aggressive chemical attack and provide appropriate	
	corrective measures before there is a loss of intended	
	functions for the cooling tower. Due to inaccessibility, the	
	effects of aggressive chemical attack on concrete surfaces	
	of foundation and below-grade exterior concrete surfaces	
```	should be dealt with on a case-by-case basis (NOREO-	
	1557). (5) Monitoring and Trending: Periodic dispection of	
	conditions of concrete surfaces at interval not to execcu o	
	years and engineering data compliation should provide	
	data for trending. Concrete surfaces of foundation and	
	below-grade exterior concrete suffaces should be deal	
	with on a case-by-case basis. 10 acceptance of act has no	
	enalling due to aggressive chemical attack. (7-9)	
	Corrective Actions, Confirmation Process, and	
	Administrative Controls: Site corrective actions program,	
	OA procedures, site review and approval process, and	
	administrative controls are implemented in accordance	
	with Appendix B to 10 CFR Part 50 requirements and will	
	continue to be applicable for license renewal. (10)	}
	Operating Experience: Structure components exposed to	
	flowing water with high chlorides have experienced	
	corrosion of rebar. Plant using seawater for cooling	
	experienced extensive rebar corrosion and concrete	
	cracking in the onshore intake structure. Corrosion	
	related problems also occurred in concrete cooling tower	
	exposed to flowing water with high sulfate or chloride	
	content.	
The AMP consists of periodic inspection	(1) Scope of Program: The program is focused on managing	NO
and plant-specific monitoring of cracks	the effects of cracking of masonry block walls on the	
of the masonry block walls. The	intended function of the component. (2) Preventive	
inspection requirements, based on the	Actions: NRC Information and Enforcement Bulletin (IEB)	
NRC Information and Enforcement	80-11 requests licensees to identify safety-related	
Bulletin (IEB) 80-11, "Masonry Wall	masonry walls, to repair the existing cracks, to conduct a	
Design", include identification of	re-evaluation of the design adequacy and consulation	
masonry walls in close proximity to, or	practices, and to establish a integration program.	
having attachments from salety-related	licensees to establish plant-specific program for	
equipment, and reevaluation of design	monitoring cracks of masonry walls, to analyze the	
adequacy and construction practices.	probably cause of the cracks, to evaluate structural	
I ne plant-specific monitoring program	adequacy of the walls, to document the repair effort, and to	
the processor of new mortar joint cracks.	provide countermeasures for preventing recurrence of	
and to prevent recurrence of cracks at	similar cracks. (3) Parameters Monitored/Inspected: IEB	1
newiously renaired joints in	80-11 and Information Notice (IN) 87-67 which monitor	
accordance with the NRC Information	existing cracks and provide countermeasures for	1
Notice 87-67, "Lessons Learned from	preventing recurrence of similar cracks. Program	
Regional Inspections of License Actions	incorporating of IEB 80-11 and Information Notice 87-67	
in Response to IEB 80-11."	throughout the license renewal period is acceptable for	
	maintaining the intended functions of the structure	
	components with respect to cracking of masonry walls due	
	to restraint, shrinkage, creep, and aggressive	
	environment.	

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Ttom	Structure and	Region of	Material	Environ-	Fifect	nging Mechanism	References
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C3.1.6	Cooling Tower	Concrete	Reinforced	Raw,	Loss of	Abrasion	NRC Regulatory
	-	Surfaces	Concrete	Untreated	Material	and	Guide 1.127
		Exposed to		Fresh		Cavitation	
		Flowing Water		Water			
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C3 ULTIMATE HEAT SINK		
Existing		Further
Aging Management Program (AMP)	Evaluation and Technical Basis	Evaluation
Aging Management Program (AMP)	Evaluation and Technical Basis (continued from previous page) (4) Detection of Aging Effects: IEB 80-11 requests licensees to identify safety-related masonry walls in close proximity to or have attachments from safety-related attachments or equipment. IN 87-67 recommends licensees to monitor cracks of masonry walls, to analyze the probably cause of the cracks, to evaluate structural adequacy of the walls, and to provide countermeasures for preventing recurrence of similar cracks. If the provisions of IEB 80-11 and the plant-specific monitoring program as suggested in the IN 87-67 are in practice throughout the license renewal period, cracking of masonry walls should be detected before there is a loss of the component intended function. (5) Monitoring and Trending: Periodic monitor and inspection provide data for trending. (6) Acceptance Criteria: No unacceptable cracking of masonry block walls due to restrain shrinkage, creep, and aggressive environment as determined by engineering analysis.(7-9) Corrective Actions, Confirmation Process, and Administrative Controls: Site corrective actions program. QA procedures, site review and approval process, and administrative controls are implemented in accordance with Appendix B to 10 CFR Part 50 requirements and will continue to be applicable for license renewal. (10) Operating Experience: Cracking of masonry block walls have occurred from restraint, shrinkage, creep, and aggressive environment. Masonry block walls have occurred from restraint, shrinkage, creep, and aggressive environment. Masonry block walls	Evaluation
The AMP consists of periodic inspections in accordance with Regulatory Guide 1.127, "Inspection of Water-Control Structures Associated with Nuclear Power Plant" which recommends that all water passages, conduits, sluices, and other concrete surfaces subjects to running water should be examined for erosion, corrosion, abrasion, cavitation, obstruction, leakage, and cracks at periodic intervals not to exceed 5 years. When significant degradation is found, Regulatory Guide 1.127 recommends that an evaluation is performed to assess the deterioration and continuing serviceability and to provide the appropriate mitigating measures.	of existing cracks has been observed and documented in some plants. (1) Scope of Program: The program is focused on managing the effects of abrasion and cavitation on the intended function of the component. (2) Preventive Actions: Regulatory Guide 1.127 recommends inspections of conditions of concrete surfaces, structural cracking, settlement, and water passage at periodic intervals not to exceed 5 years, and includes engineering data compilation. Other recommendations include examination of cooling water channels and canals for channel bank erosion, bed aggravation or degradation and siltation and examination for any conditions that may impose operational constraints. When significant degradation is found, Regulatory Guide 1.127 recommends that an evaluation is performed to assess the deterioration and continuing serviceability and to provide the appropriate mitigating measures. Corrective actions are based on the results of the above inspections. (3) Parameters Monitored/Inspected: The parameters inspected are the conditions of the concrete surfaces for signs of degradation due to abrasion and cavitation. (4) Detection of Aging Effects: Regulatory Guide 1.127 recommends all concrete surfaces of spray pond and cooling tower subject to running water should be examined for abrasion and cavitation at	No

### VII AUXILIARY SYSTEMS C3. ULTIMATE HEAT SINK

Structure and Component     Region of Interest     Material     Environ- ment     Aging Effect     Aging Mechanism     Reference       C3.1.7     Cooling Tower thru C3.1.11     Columns. Base Plates, Trusses, Bracings     Structural Steel Galvanized)     Outdoors Ambient Conditions     Loss of Material     Corrosion Material     NRC Regulai Guide 1.127	em Component Interest Material ment Effect Mechanism Refe	rences
Item     Component     Interest     Material     ment     Effect     Mechanism     Reference       C3.1.7     Cooling Tower     Columns, Base Plates, C3.1.11     Structural Base Plates, Trusses, Bracings     Outdoors Stel (Painted or Oalvanized)     Loss of Ambient Conditions     Corrosion     NRC Regulat Guide 1.127	em Component Interest Material ment Ellect Mechanism Refe	rences
C3.1.7     Cooling Tower     Columns.     Structural     Outdoors     Loss of     Corrosion     NRC Regular       thru     Base Plates.     Steel     Ambient     Material     Guide 1.127       C3.1.11     Trusses.     Galvanized)     Conditions     Material     Guide 1.127		
C3.1.7     Cooling Tower     Columns, Base Plates, Steel     Structural Ambient     Outdoors Ambient     Loss of     Corrosion     NRC Regulat       C3.1.11     Steel     Painted or Trusses, Bracings     Conditions     Material     Corrosion     NRC Regulat		
C3.1.71 Cooling Tower Columns, Structural Coutdoors Loss of Corrosion NRC Regular Base Plates, Beams, (Painted or Trusses, Galvanized) Conditions Guide 1.127		
	1.7     Cooling Tower     Columns, Base Plates, Beams, Trusses, Bracings     Structural (Painted or Calvanized)     Outdoors Ambient Conditions     Loss of Material     Corrosion     NRC Rej Guide 1.	gulatory 127

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C3 ULTIMATE HEAT SINK

Evicting		Further
Aging Management Program (AMP)	Evaluation and Technical Basis	Evaluation
The AMP, based on Regulatory Guide	(Continued from previous page) periodic intervals not to exceed 5 years. Aging management program consistent with Regulatory Guide 1.127 should detects degradation of concrete surfaces due to abrasion and cavitation and provides mitigating measures before there is a loss of component intended function. (5) Monitoring and Trending: Periodic inspection of conditions of concrete surfaces at interval not to exceed 5 years and engineering data compilation should provide data for trending. (6) Acceptance Criteria: No unacceptable visual indication of loss of concrete material due to abrasion and cavitation. (7-9) Corrective Actions, Confirmation Process, and Administrative Controls: Site corrective actions program. QA procedures. site review and approval process. and administrative controls are implemented in accordance with Appendix B to 10 CFR Part 50 requirements and will continue to be applicable for license renewal. (10) Operating Experience: Loss of material of concrete surfaces that are continuously exposed to flowing water have occurred by abrasion and cavitation.	No
1.127, relies on periodic inspection of all structural steel components of	the effects of structural steel corrosion on the intended function of the component. (2) Preventive Actions:	
tower for corrosion at periodic intervals not to exceed 5 years. When significant	water-control structures at periodic intervals not exceed 5 years for any significant deterioration caused by	
degradation is found, Regulatory Guide 1.127 recommends that an evaluation is	corrosion of structural steel, including cracking, discoloration, wear, pitting, excessive corrosion, surfaces	
performed to assess the deterioration and continuing serviceability and to	preventive measures. Other recommendations include	
measures.	channel bank erosion, bed aggravation or degradation and siltation and examination for any conditions that may	
	impose operational constraints. When significant degradation is found. Regulatory Guide 1.127 recommends	
	and continuing serviceability and to provide the	
	based on the results of the above inspections. (3) Parameters Monitored/Inspected: The parameters	
	inspected are the conditions of the structural steel surfaces (columns, base plates, beam, trusses, and bracings, etc.) for	
	any signs of degradation due to corrosion, such as cracking, discoloration, wear, pitting, excessive	
	corrosion, surfaces discontinuities, and coating degradation. (4) Detection of Aging Effects: Regulatory	
	Guide 1.127 recommends all structural steel surfaces (columns, base plates, beam, trusses, and bracings, etc.) of	
	spray pond and cooling tower should be examined for signs of corrosion at periodic intervals not to exceed 5	
	years. Aging management program consistent with Regulatory Guide 1.127 should detects degradation of	
	Structural steel surfaces due to corrosion, and	

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VII AUXILIARY SYSTEMS



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C3 ULTIMATE HEAT SINK		Europhan
Existing Aging Management Program (AMP)	Evaluation and Technical Basis	Evaluation
Aging Management Program (AMP)	(Continued from previous page) provides mitigating measures before there is a loss of component intended function. (5) Monitoring and Trending: Periodic inspection of conditions of structural steel surfaces at interval not to exceed 5 years and engineering data compilation should provide data for trending. (6) Acceptance Criteria: No unacceptable visual inspection of loss of material of structural steel components due to corrosion. (7-9) Corrective Actions, Confirmation Process, and Administrative Controls: Site corrective actions program. QA procedures, site review and approval process, and administrative controls are implemented in accordance with Appendix B to 10 OFR Part 50 requirements and will continue to be applicable for license renewal. (10) Corrating Experience: Scuctural stel corrosion has occurred in the water-control structures.	
The AMP relies on preventive actions by selecting corrosion resistant materials, lesigning with corrosion allowance or providing corrosion resistant interior ining or coating, and inservice nspection (ISI) in conformance with ASME Section XI (edition specified in 10 CFR 50.55a). Table IWD 2500-1, test and examination category D-B for Class 3 pressure retaining components.	(1) Scope of Program: The AMP relies on selecting corrosion resistant materials, corrosion allowance or corrosion resistant lining or coating, and ASME Section XI inservice inspection (SI) for managing the effects of corrosion and selective leaching on intended function of the emplored corrosion resistant materials such as red brass and copper-nickel, using a coating prevent corrosion and encover leaching by protecting the underlying matrix scales from being exposed to corrosive environment, and unpost ted piping, e.g., carbon steel used of firsh where sistens, are designed with a corrosion allowane. (1) Intrameters Monitored/Inspected: ASME Section 11 allowWD 250001, enegory D-B requires visual VT-2 eximination during system leakage and hydrostatic test to detect leakage. Departation due to pitting and crevice corrosion of the component can not occur without leakage of ration fresh water, extent and inspection schedule assure detection of leakage before the loss of intended function of the component. (4) Detection of Aging Effects: Concentration of sulfates and chlorides in water can cause localized corrosion under crevice conditions such as gasket surfaces, joints, and under bolt heads. Also, systems that use untreated water are particularly susceptible to microbiologically-induced corrosion. System leakage and pressure tests may not be	Yes, Bionard Sc further evenances.
	adequate to detect these forms of corrosion; inspection of representative components and susceptible locations should be undertaken to ensure that significant corrosion is not occurring. Based on piping/component geometry and fluid flow conditions, susceptible locations can be identified. (5) Monitoring and Trending: Inspection schedule of ASME Section XI should provide for timely detection of leakage. System leakage test is conducted prior to plant startup following each refueling outage	

Structure and Component     Region of Interest     Environ- Material     Aging ment     Aging Mechanism     Refe       C3.3.1     Check, Hand. & Control Valves     Body and Bonnet (With or Without Internal Lining or Coating     Bronze, SS     Raw Untreated Fresh Water     Loss of Material     General, Material     ASM S Micro- biologically Plant		C.S. ULTIMAT	E HEAT SING				·····	
Item     Component     Interest     Material     ment     Ellect     weenanism     Rele       C3.3.1     Check, Hand, & Control Valves     Body and Bonnet With or Without Internal Liming or Coating     Bronze, SS     Raw Untreated Fresh Water     Loss of Material     General, Micro- biologically Plant     ASM S 1989 J Untreated Speede Corrosign. Seeding for bronze material]		Structure and	Region of		Environ-	Aging	Aging	Deferences
C3.3.1 Check Hand, & Control Valves Bonnet Untreated Without Internal Lining or Coating Bonnet Without Internal Lining or Coating Bonnet BSS Firesh Water Bonnet SS Firesh Water Bonnet SS Firesh Water Corrosich. Lining or Coating Bonnet SS Firesh Water Corrosich. Specho Pitting, and Crevice Corrosich. Specho Pitting, and Crevice Corrosich. Stating Bonnet Bonnet SS Firesh Water Coating Bonnet Coating Bonnet Crevice Corrosich. Specho Pitting, and Crevice Corrosich. Specho Pitting, and Crevice Corrosich. Specho Pitting, and Crevice Corrosich. Specho Pitting, and Crevice Corrosich. Specho Pitting, and Crevice Corrosich. Specho Pitting, and Crevice Corrosich. Specho Pitting Bonze Notorze Corrosich. Specho Pitting Bonze Corrosich. Specho Pitting Bonze Specho Pitting Bonze Bonze Corrosich. Specho Pitting Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonze Bonz Bonz Bonz Bonz Bonz Bonz Bonz Bonz	Item	Component	Interest	Material	ment	Ellect	wiechanism	References
C3.3.1 Check, Hand, & Control Valves Without Internal Lining or Coating States of General, Without Internal Lining or Coating States of General, Material Micro- Biologically Plant Untreated Fresh Water States of Material Material Material Specific Corrosign. Selective Leaching (for bronze material)							-	
C3.3.1 Check Hand, & Control Valves Bonnet SS With or Without Internal Lining or Coating Control Valves Valves Vithout Internal Lining or Coating Control Coating Control Coating Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Con Control Control Control Control								2
	C3.3.1	Check. Hand, & Control Valves	Body and Bonnet (With or Without Internal Lining or Coating	Bronze, SS	Raw Untreated Fresh Water	Loss of Material	General, Micro- biologicalle -Induced, Pitting, and Crevice Corrosion. Selective Leaching (for bronze material)	ASM Senion XI. 1989 Edition. Plant Achnical Specifications. VII C 2 - 1

### AUXILIARY SYSTEMS VΠ

Existing	Evaluation and Technical Basis	Further
Aging Management Program (AMP)	Evaluation and reclinical basis	Evaluation
Aging Management Program (AMP)	(Settimed free people of the p	
	and fresh water may concentrate. The NRC performed service rater system operational performance inspection on the results have been discussed in NRC Information Notice (IN) 94-03.	2
The AMP relies on preventive actions by selecting corrosion resistant materials, designing with corrosion allowance or providing corrosion resistant interior lining or coating, and inservice inspection (ISI) in conformance with ASME Section XI (edition specified in 10 CFR 50.55a), Table IWD 2500-1, test and examination category D-B.	<ul> <li>(1) Scope of Program: The AMP relies on selecting corrosion resistant materials, corrosion allowance or corrosion resistant lining of coating, and inservice inspection (ISI) for managing the effects of corrosion and selective leaching on intended function of the valves.</li> <li>(2) Preventive Actions: The component is constructed of corrosion relieve in materials such as red brass and copped nodel for or certaing the occurrence of corrosion. Carbon steel components are provided with corrosion allowance biodenesis multiple or coating.</li> <li>(3) Parameters Mot it red/Inspected Examination categories B of SMC Sectional Table IWD 2500-1 requires on the section of the leakage. Degradation due to print and crevice corrosion of the component can proport without leakage of raw or fresh water, extent an inspection schedule assure detection of leakage before the loss of intended function of the component. (4) Detection of Aging Effects: Concentration of sulfates and chlorides can cause localized corrosion under crevice conditions such as gasket surfaces, joints, and under bolt heads. Also, systems that use untreated water are particularly susceptible to microbiologically-induced corrosion. System leakage and pressure tests may not be adequate to detect these forms of corrosion; inspection of representative valves and susceptible locations should be undertaken to ensure that significant corrosion is not occurring. This inspection can be visual a the valve is disassembled, and may be covered by the plant maintenance program. UT thickness measurements are detection of the valve is disassembled.</li> </ul>	Yes,

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C3 ULTIMATE	HEAT SINK		Further
Existing	ogram (AMP)	Evaluation and Technical B	asis Evaluation
Aging Management The	Continue		
	should pr	ovide for timely detection of leal	kage. System
	leakage te	st is conducted prior to plant st	artup following
	each refue	ling outage and hydrostatic test	at opticar the
	end of eac	h inspection interval. (6) Accept	gaice Criteria:
	Any releva	int conditions that may be deter	ted during the
	leakage a	nd hydrostatic tests are galuate	d in accordance
	with IWD-	3000. (7) Corrective Actions: IV	VA-5250 requires
	that the se	ource of leakage detected during	the pressure test
	should be	located and evaluated for correct	tive measures.
	- Repair an	d replatement are in accordance	s with IWA-4000
	and IWA-	100. (8 & 9) Confirmation Proc	actions program
	Agonalsi	Fatibe Controls: Site corrective	actions program.
		ative controls are implemented	in accounting
		adive controls are implemented	the stand will
	with Appe	to be applicable for license the	wal.
	(10) Oper	ating Experience: Localized con	rosion may occur
a second s	at location	ns having stamant flow conditi	ons where
	Impusities	may micentrate The NRC pe	rformed service
	water sys	operational performance in	spection and the
	V results	We been discussed in NRC Infor	mation Notice
-	(IN: 04-03		
The AMP relies on prever	ntive actions by	of 110gram: The AMP relies on	corrosion Yes.
providing corrosion resis	stant interior resistant	linings and coating and combin	nation of both
linings or coating, and ir	inservice inservice	inspection (ISI) and inservice to	esting (ISI) for
inspection (ISI) in confor	mance with managing	the electe of corrosion on inte	and costing
ASME Section XI (edition	specified in 10 the pump	. (2) reventive Actions: Lining	and coaling
CFR 50.55a), Table IWD 2	500-1, test and prevent c	or bain by p technig the under	environment
examination category D-I	B for Class 3 surfaces	atom being a pared / Inspected: T	he AMP monitors
pressure retaining compo	inerits; and 10/ 10/	a consign by ISI to detect lea	kage and IST to
based on the testing requ	te Class 3	propriet performance. In pection	requirements of
CFR 50.55a for ASME Co	RC staff	ton XI. Table IWD 2500 1, cate	gory D-B, specify
guidelines of NRC Generic	Letter 89-04.	-2 A-5240) & mination dur.	ing system
inservice testing perform	ied in nez age a	to he Fosteric test. Based on th	he requirements
accordance with ASME S	ubsection IWP	50.55a for / SME code Class 1,	2, and 3 pumps
(or Operation and Mainte	nance Code ar hale	onal glid lines of NRC Generic	Letter (GL) 89-04.
Subsection ISTB) for pun	nps, or other IST s per	formed in accordance with ASN	AE Subsection
approved program in the	plant IWP for Q	MC die Gubsection ISTB). (4) De	tection of Aging
specifications.	Effects:	radation of the component di	ne to corrosion
	would res	suit in leakage of system water t	edule of ISI/IST
	compone	tection of corrosion before the 1	oss of intended
Å	assure de	of the component. However, ins	spection of
	Tenresen	tative components and suscepti	ble locations
X	should h	e undertaken to ensure that sig	nificant corrosion
	is not occ	curring. This inspection can be	visual if the pump
	is disass	embled, and may be covered by t	he plant
	maintena	ince program. UT thickness me	asurements could
	also be u	sed. (5) Monitoring and Trendi	ng: ISI/IST
	schedule	of ASME Section XI should pro	wide for timely
	detection	of corrosion. System leakage to	est is conducted
	prior		
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### VII AUXILIARY SYSTEMS C3. ULTIMATE HEAT S

	C3. ULTIMAT	E HEAT SINK					
Item	Structure and Component	Region of Interest	Material	Environ- ment	Aging Effect	Aging Mechanism	References
	Component						
			4				
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	1	L			1		

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C3 ULTIMATE HEAT SINK		
Existing Aging Management Program (AMP)	Evaluation and Technical Basis	Further Evaluation
	(Contributed from preblous page) to plant startup following each refueling outage, and hydrostatic test at or near the end of each inspection interval. (6) Acceptance Criteria: Any relevant conditions that may be detected during the leakage and hydrostatic tests are evaluated in accordance with IWD-3000 for Class 3 components. (7) Corrective Actions: : IWA-5250 requires that the source of leakage detected during the pressure test should be located and evaluated for corrective measures. Repair and replacement are in accordance with IWA-4000 and WA-7000. (8 & 9) Confirmation Process and initistrative Controlse Site OA procedum sources approval processes, and administrative controls are implemented in accordance with requirements of Appendix B to 10 CFR Part 50 and will continue to be applicable for the period of licener renewal. (10) Operating Experience: Pitting and provice corrosion may occur in portion of the system such as locations having stagnant flow conditions oner impurities in raw and fresh water may concernate.	

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# GALL REPORT-MECHANICAL DISCIPLINE COMMENTS SECTION VIIC.3

GALL SECTION	TITLE	ITEM NO.	PAGE	REVIEWER	COMMENT
VII C3-1	Ultimate Heat Sink	C3.2.1 C3.3.1	VII C3-20 VII C3-21 VII C3-22 VII C3-23		<ul> <li>Brass, copper nickel alloys and stainless steels are not subject to general corrosion. Remove these materials from any groupings with carbon steel and create new line item, where applicable and/or delete reference to general corrosion when these materials are identified independent of carbon steel.</li> <li>Aging effect should be loss of material with the related aging mechanisms of pitting corrosion, crevice corrosion, MIC and selective leaching (for bronze material).</li> <li>Reference to ASME Section XI, OM code, GL 89-04, and Tech Specs should be deleted from References and AMP columns. The Evaluation and Technical Basis column should be deleted in its entirety based on unique plant features and management philosophy.</li> <li>The AMA will be a plant specific activity requiring further NRC evaluation</li> </ul>
VII C3-2	Ultimate Heat Sink	C3.2.1 C3.3.1 C3.4.1	VII C3-20 VII C3-22 VII C3-24		General corrosion of lined carbon steel is listed as an aging mechanism. Lined carbon steel pipe may be susceptible to localized corrosion in areas of lining degradation but will not be susceptible to gross wastage. This position was accepted in the CCNPP SER.
VII C3-3	Ultimate Heat Sink	C3.4.1	VII C3-24 VII C3-25		Reference to ASME Section XI, OM code, GL 89-04, and Tech Specs should be deleted from References and AMP columns. The Evaluation and Technical Basis column should be deleted in its entirety. The AMA will be a plant specific activity requiring further NRC evaluation.

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# D. Compressed Air System

- D.1 Piping
  - D.1.1 Piping and Fittings
- D.2 Air Accumulator
  - D.2.1 Shell
  - D.2.2 Manway
  - D.2.3 Manway Bolting
- D.3 Valves
  - D.3.1 Body and Bonnet
- D.4 Filter
  - D.4.1 Shell
  - D.4.2 Manway
  - D.4.3 Manway Bolting

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VII D-2

### D. Compressed Air system

# System, Structures, and Components

The system, structures, and components included in this table comprise the compressed air system which consists of piping, valves, air accumulators and filters. The components normally contain very dry air, free of oil, water, and other contaminants. The system components and piping are located in various buildings at most nuclear power plants. Based on US Nuclear Regulatory Commission Regulatory Guide 1.26, "Quality Group Classifications and Standards for Water, Steam, and Radioactive-Waste-Containing Components of Nuclear Power Plants," all components in the compressed air system are classified as Group C Quality Standards.

Valves are considered to be active components and seats, discs, bolting, and other valve items should be covered by the plant maintenance program.

### System Interfaces

No other systems contained in this report interface with the compressed air system.





VII AUXILIARY SY D. COMPR	STEMS ESSED AIR SYST	EM		V	110-1	V11.3	
Structure and	i Region of	Material	Environ- ment	Aving Effect	Aging Mechanism	References	
D.4.1 Filter thru D.4.3	Shell. Manway. Manway Bolting		Internal: Cocca- sionally Exposure to Moist Air. External: Room Air	Lossof	Corresion	NRC IN 81-37. NRC IN 87-28. NRC IN 87-28 S1. NRC GLOS-14. INPO JOER 88-01. ASMJ. OM GUAde Part 17.	5

# VI AUXILIARY SYSTEMS D. COMPRESSED AIR SYSTEM Aging Management Program (AMP) Evaluation and Technical Basis Further Same as the effects of General and Pitting Corrosition on Item D.1.1 piping Same as the effects of General and Pitting Corrosition Yes, Image: A structure of the second structure of the

# GALL REPORT-MECHANICAL DISCIPLINE COMMENTS SECTION VII D

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GALL SECTION	TITLE	ITEM NO.	PAGE	REVIEWER	COMMENT/ RESOLUTION
VII.D-1	Auxiliary Systems - Compressed Air System	D.1.1, D.2.1 Thru D.2.3, D.3.1, D.4.1 Thru D.4.3	VII D-4 VII D-5 VII D-6 VII D-7		The environment column identifies the external environment as room air. External environments have not been provided in the majority of the GALL report. Thus, recommend deleting any reference to external environments until a common approach is developed for the remaining plant systems and components.
VII.D-2	Auxiliary Systems - Compressed Air System	D.1.1, D.2.1 Thru D.2.3, D.3.1, D.4.1 Thru D.4.3	VII D-4 VII D-5 VII D-6 VII D-7		The compressed air system expected to be in-scope for license renewal is the Instrument Air (IA) system and the portion the plant service air system that penetrates the containment structure. The IA system design usually has the component order of compressor, accumulator, and dryer. The accumulator receives air from the air compressor, which is normally the portion of the system exposed to "saturated" air. Equipment located downstream of the dryers are exposed to "dry" and "oil free" air and as such are not susceptible to age related degradation. Thus, delete "Dry, Oil-Free Air" from Environment" column. This section should only address equipment that is exposed to "saturated air" as discussed above. The AMA to manage the aging effect of loss of material as the result of general and pitting corrosion should be plant specific based on the differences in system design and management philosophy. Delete the existing AMP and Evaluation and Technical Basis columns in their entirety and replace with the " <i>Plant-specific aging management activity is to be evaluated</i> ." Hence, further evaluation is warranted (no AMA).

# E1. Chemical and Volume Control System (Pressurized Water Reactor)

- E1.1 Piping (1500 psig rating)
  - E1.1.1 Pipe, Fittings and Flanges
  - E1.1.2 Stud and Nuts
- E1.2 Piping (150 psig rating)
  - E1.2.1 Pipe, Fittings and Flanges
  - E1.2.2 Studs and Nuts
- E1.3 High-Pressure Valve
  - E1.3.1 Body and Bonnet
  - E1.3.2 Studs and Nuts
- E1.4 Low-Pressure Valve
  - E1.4.1 Body and Bonnet
  - E1.4.2 Studs and Nuts
- E1.5 High-Pressure Pump
  - E1.5.1 Casing
  - E1.5.2 Closure Bolting
- E1.6 Low-Pressure Pump
  - E1.6.1 Casing
  - E1.6.2 Closure Bolting
- E1.7 Letdown Heat Exchanger
  - E1.7.1 Tube/Tubesheet
  - E1.7.2 Studs and Nuts
  - E1.7.3 Channel/Cover
  - E1.7.4 Channel/Welds

### E1.7.5 Shell

- E1.8 Regenerator Heat Exchanger
  - E1.8.1 Tube/Tubesheet
  - E1.8.2 Studs and Nuts
  - E1.8.3 Channel/Cover
  - E1.8.4 Channel/Welds
  - E1.8.5 Shell
- E1.9 Basket Strainers
  - E1.9.1 Studs and Nuts
- E1.10 Tank
  - E1.10.1 Studs and Nuts

E1.10.2 Shell

E1.10.3 Manway

E1.10.4 Penetrations/Nozzles

## E1. Chemical and Volume Control System (Pressurized Water Reactor)

### System, Structures, and Components

The system, structures, and components included in this table comprise the pressurized water reactor (PWR) chemical and volume control system and consist of piping, valves, heat exchangers, pumps, basket strainers, and tank. The majority of the components contain chemically treated borated water, except the heat exchangers which contain chemically treated demineralized water. Based on US Nuclear Regulatory Commission Regulatory Guide 1.26, "Quality Group Classifications and Standards for Water, Steam, and Radioactive-Waste-Containing Components of Nuclear Power Plants," all components in the chemical and volume control system are classified as Group C Quality Standards.

Pumps and valves are considered to be active components and pump internals and seats, discs, bolting, and other valve items should be covered by the plant maintenance program.

### System Interfaces

The systems that interface with the chemical and volume control system include the reactor coolant system (Table IV C2), emergency core cooling system (Table V D1), containment spray system (Table V A), spent fuel pool cooling system (Table VII A3), and closed cycle cooling water system (Table VII C2).

### AUXILIARY SYSTEMS VII

# VOLUME CONTROL SYSTEM (Pressurized Water Reactor)

E	I. UHEMICA	Design of		Environ- I	Aging	Aging	
	Structure and	Region of	Material	ment	Effect	Mechanism	References
Item	Component	Dine Eithings	Dine	Chemically	Cumulative	Fatigue	ANSI B31.1.
E1.1.1	High Pressure	ripe, rituings,	Fittings and	Treated	Fatigue	-	
E1.1.2	Piping (1500	and rianges.	Flanges:	Borated	Damage		
	psig rating	Sidus and	Stainless	Water up to	-	-	
		Nuts	Steel (SS)	340°C.			
			Studs and				
			Nuts: Low-				
			Alloy Steel	•			
			(LAS).				
			Carbon Steel				
			(CS)	L		Baria Agid	NRC GL 88-05.
E1.1.2	High Pressure	Studs and	LAS, CS	Air,	Loss of	Corresion	
	Piping (1500	Nuts		Leaking	Material	Corrosion	
	psig rating)			Chemically			
			1	Bernted			
				Water			
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AUXILIARY SYSTEMS VΠ CHEMICAL AND VOLUME CONTROL SYSTEM (Pressurized Water Reactor) Further Existing Evaluation Evaluation and Technical Basis Aging Management Program (AMP) Yes Fatigue is a time-limit aging analysis (TLAA) to be Components have been designed for performed for the period of license renewal, check Code TLAA fatigue for a 40 y design life according to limits for allowable cycles (less than 7000 cycles) of the requirements of ANSI B31.1. thermal stress range. DELETE / REWRITE PER VILEI-Z program locuses on managing NRC OF 8-05 to anage loss of material due to carbon steel and low alloy steel components. general corrosion, pitting and crevice on small leaks which generally occur below ical corrosion on carbon steel and low alloy specification limits for operational lealest steel components as a result of borated (2) Preventive Actions: Periodic insection and removal of any borated water residue from component surface during water leaks, the AMP generally includes: (1) Identify the examination system walkdown help to prevent the occurrence of locations where borated water leaks borated water correction. Identification of the potential could occur, including insulated locations of lockage and the path of leaking acid also components and inaccessible areas. helps to prevent the occurrence of the borated water leak The focus is on small leaks which (2) Parameters Monitored/Mspecied: The AMP period generally occur below technical visual inspection for discoloration of insulation and specification limits for operational borated water residue which are signs of borated water leakage. (2) Establish the path of the leakage. Visual inspection, such as VT-2, an effective leaking borated water and the method for identification of discolorition and borated components it likely to contact to water residue. One or more study are removed and ensure that leaks of borated water are examined for evidence of bonc acid corrosion. promptly identified and corrected. (3) (4) Detection of Aging tiffects: The AMP establishes the Perform visual inspection at least once path of the leaking borated water and the components it at each refueling outage to identify and likely to contact to ensure that leaks of borated water are quantify any leakage at specific promption dentified and corrected before there is a loss of locations and to remove any borated imponent intended function. (5) Monitoring and water residue that is found. Visual rending: The visual inspection is an effective method for examination, such as VT-2 visual detecting the signs of boric water leaks. Periodic examination is generally used for inspection provides data for trending. (6) Acception evidence of leaks such as discoloration Criteria: No discoloration or borated waterresidue found and borated water residue. (4) on surfaces of components, insulation, or floor areas that Investigate any leakage that is found may indicate borated water leakage. No leakage of nonand locate leak source and areas of insulated and insulated components. No leakage of corrosion. Evaluate the affected accessible and inaccessible components. (7-9) Corrective components for continued service by Actions, Configuration Process, and Administrative engineering analysis. Corrective Controls: The corrective actions program, QA procedures, actions include repair or replacement of Ew and approval process, and administrative the affected components and correction site i rols are implemented in accordance with Appendix of any equipment deficiencies that to 10 CFR Part 50 requirements and will continue to be cause the leaks. adequate for license renewal. Corrective sections include repair or replacement of the affected components and correction of any equipment deficiencies that cause the leaks. (10) Operations Experience: Leakage of borated water from bolted whits or seals has frequently caused severe n of carbon steel and low alloy steel components COLLOSI VII E 1-3 in as bolts, studs, and fasteners. BORIC ACTA DORROSION PROGRAM SEE CHANTER

E1. CHEMICAL AND VOLUME CONTROL SYSTEM (Pressurized Water Reactor)								
	Structure and	Region of		Environ-	Aging	Aging		
Item	Component	Interest	Materia	mentari	Ellet	Mecanism	References	
E1.2.1	Low Pressure	Pipe, Fittings,	Pipe,	Chemically	Cumulative	Fatigue	ANSI B31.1.	
E1.2.2	Piping (150	and Flanges	Fittings, and	Treated	Fatigue 7	ELETE	EHER	
	psig rating)	Stud and Nu s	Flanges: SS	Borated	Damage L			
			Studs and	Water up to	N N	IIEF-	4.	
			Nuts: LAS,	100°C.		III EF	1.1	<b>y</b>
			CS					
E1.2.2	Low Pressure	Studs and	LAS, Co	An,	Loss of	DOFIC menu	NRC GL 88-05	
	Piping (150	Nuts		Leaking	Material	Corrosion		
	psig rating)			Chemically				
	i i i i i i i i i i i i i i i i i i i			Treated				
				Borated				l
				Water	Y age 1 I ago of	Ditting	DL 04-18	1
E1.2.1	Low Pressure	Pipe, Fittings,	ss	Chemically	LOCAL LOSS OL	Corresion	Plant-Technical	
	Piping (150	and Flanges	1	Borated	Material	and Crevice	-Specifications.	1
	psig rating)			Water un to		Corrosion	-00-	l
				100°C			EPILL	1
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#### VII AUXILIARY SYSTEMS E1. CHEMICAL AND VOLUME CONTROL SYSTEM (Pressurized Water Reactor)



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AUXILIARY SYSTEMS VII



E1. CHEMICAL AND VOLUME CONTROL SYSTEM (Pressurized Water Reactor)

Existing		Further
Aging Management Program (AMP)	Evaluation and Technical Basis	Evaluation
	steel piping pertaining to the use of heat tracing to potentially significant problem. Seven through-wall cracks have been observed in a stratess steel piping at regions where the pipes or get. The cracks are caused by the combination of the chlorides concentration and the heat product of the next tracing	
Components have been designed for fatigue for a 40 y design life according to the requirements of ANSI B31.1.	Fatigue is a time-limit aging analysis (TLAA) to be performed for the period of license renewal, check Code limits for allowable cycles (less than 7000 cycles) of thermal stress range.	Yes TLAA
Same as for Fatigue of Item E1.3.1 and E1.2.2, Body and Bonnet, Studs and Nuts.	Same as for Fatigue of Item E1.3.1 and E1.2.2, Body and Bonnet, Studs and Nuts.	Yes TLAA
The AMP, implemented by plant technical specifications, relies on minimizing impurities by monitoring and maintaining the borated water chemistry conditions. Because the diameter of piping is generally less than 4 inches, inservice inspection (ISI) of ASME Section XI Table IWD 2500-1. test and examination category D-B for Class 3 pressure retaining components is usually exempted.	(1) Scope of Program: The program relies on monitoring and maintaining the chemistry conditions of the borated water for managing the effects of pitting corrosion and crevice corrosion on the intended function of the component. (2) Preventive Actions: The program contains chemical parameter specifications, sampling frequency, analysis and corrective actions. Monitoring and maintaining the borated water chemistry conditions will help to minimize the rate and effects of component degradation. The preventive actions, however, are considered inadequate because of inadvertent introduction of impurities into the system due to unacceptable levels of contaminants in the borated water (IN 84-18). Pitting corrosion and crevice corrosion may occur at locations having stagnant flow conditions where impurities in borated water fluid may concentrate over the years. (3) Parameters Monitored/Inspected: Chemical parameters, such as impurities are monitored and controlled. (4) Detection of Aging Effects: High concentration of impurities at locations having stagnant flow could cause pitting and crevice corrosion under crevice conditions such as gasket surfaces, and joints. Therefore, an one-time inspection of representative components and susceptible locations should be undertaken to ensure that significant corrosion is not occurring. This inspection can be visual if the valve is disassembled and may be covered by the	Yes, Element 4 should be further evaluated

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VII E1-11

Item	Structure and Component	Region of Interest	Material	Environ- ment	Aging Effect	Aging Mechanism	References
						-	
E1.4.1	Low Pressure Valves (Check,	Body and Bonnet	SS	Chemically 37 June	Local Loss of Material	Pitting Corrosion	IN 84-18. Plant Technica
1.3.2	Control, Hand, Motor Operated, Pressure Control, and Relief Valves) High Pressure Valves (Check, Control	JELE VIIE VIIE Stud and	1-6 1-7 1-7	Air,	E/-E	Boric Arid	NRC 6 88-05.
E1.4.2	Hand, Motor Operated, Pressure Control, and Relief Valves) Low Pressure Valves (Check,	Studs and Nuts	LAS, CS	Treated Borated Water Air. Leaking	Loss of Material	Boric Acid Corrosion	NRC GL 88-05.
	Control, Hand, Motor Operated, Pressure Control, and Relief Valves)			Treated Borated Water			

E1. CHEMICAL AND VOLUME CONTROL SYSTEM (Pressurized Water Reactor)

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#### AUXILIARY SYSTEMS VII

CHEMICAL AND VOLUME CONTROL SYSTEM (Pressurized Water Reactor) E1. Further Existing Evaluation Evaluation and Technical Basis Aging Management Program (AMP) (continued from previous page) plant maintenance program. Ultrasonic thickness measurements could also used. Follow up actions are based on the inspection results and plant technical specification. (5) Monitoring and Trending: Sampling of chemistry condition performs periodically. The data provides trending. The results of the one time inspection should be used to dictate the future inspection.(6) Acceptance Criteria: The chemistry monitoring program provides chemical parameter specification and acceptable levels. (7) Corrective Actions: Plant chemistry control program specifies the target values for chemistry parameter in the borated water. If the specified values are exceeded, corrective actions are initiated to bring the chemistry parameters back to normal levels. Corrective actions of the above one time inspection are based on the results of the inspection. (8 & 9) Confirmation Process, and Administrative Controls: Site corrective actions program. QA procedures, site review and approval process, and administrative controls are implemented in accordance with Appendix B to 10 CFR Part 50 requirements and will continue to be adequate for license renewal. (10) Operating peperience. Significant corrosion-related problems have not been reported for the compo Same as for Pitting Corrosion and Crevice Corrosion of Yes. Same as for Pitting Corrosion and Element 4 Crevice Corrosion of Item E1.3.1 Body Item E1.3.1 Body and Bonnet. should be and Bonnet. further evaluated No Studs and oric Acide em El orrosion me as Item E1.1.2 Studs and I Same as for Boric Acid Corrosion of Item E1.1.2 Studs and No Same as for Boric Acid Corrosion of Item E1.1.2 Studs and Nuts. Nuts.

VILA AUXILARY	TEMS		Matheway and				
E1. CHEM	IICAL AND TOEUN	ME CONTROL	STEM (Press) Environ-	Aging	Aging		
item Componen E1.4.1 Low Pressur Valves (Che Control, Hand Moto	nt Interest re Body and cck. Bonnet	Material SS	ment Exterior Surfaces: Adhered	Effect Crack Initiation	Mechanism Stress Corrosion Cracking	References NRC IN 85-34.	
Operated. Pressure Control. an Relief Valve	d es)		Electral Heat Tracing Maintain out to 100°C. Interior Surface Chemically Treated Formed Water up to			۰ ۲	
E .5.1 Hig Pressu E1.5.2 Pap	ire Cising, Cloure Bolting	Corg: S. Cossure Bolting: CS, S	108°C Chemodily Treated Borated Wata 100 340°	Cumulativ Fatigue Damage	Fatigut	INSI B31 1	
E1.6.1 Low Pressu E1.6.2 Pump	re Closure Bolting	Closure Bolting: CS, LAS	Cheinicany Treated Borated Water up to 100°C.	Cumulative Fatigue Damage	Fatigue	ASME Section III, 1989 Edition. ANSI B31.1. GSI-190.	
1.5.2 ligh Prost	Bolt	AAS CON	Air, Deaking Chemically Treated Borated Water	Loss of	Boar Acid	ACC GL 88-03	
E1.6.2 Low Pressu Pump	re Closure Bolting	LAS, CS	Air, Leaking Chemically Treated Borated Water	Loss of Material	Boric Acid Corrosion	NRC GL 88-05.	
E1.5.1 High Press Pump	ure Casing	SS	Chemically Treated Borated Water up to 340°C.	y Local Loss of Material	Pitting Corrosico and Crevice Corrosion	ASME-Section 71, 1909 Edition Asmer Subsection NRC GL 89-04. NRC IN 84-18. NRC IN 96-11. Plant Technical Specifications.	

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VII E1-14

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ARY SYSTEMS CHEMICAL AND VOLUME CONTROL SYSTEM (Pressurized Water Reactor) E1. Further Existing Evaluatio Evaluation and Technical Basis Aging Management Program (AMP) Same as for Stress Corrosion Cracking of Item E1.2.1 Pipe Yes, Same as for Stress Corrosion Cracking DELETE PER VIIEI-6 VIIEI-9 VIIEI-7 Element of Item E1.2.1 Pipe, Fittings, and Fittings, and Flanges. should be Flanges. further evaluated Fatigue is a time-limit aging analysis (TLAA) to be Yes Componente have been designed for performed for the period of license renewal, check Code TLAA fatigue for a 40 y design life according to limits for allowable cycles (less than 7000 cycles) of the requirements of ANSI B31.1. stro harm Yes ame as for Fatigue of Items E Same as for Fatigue of I TLAA Closure Bolting. E1.5.2 Casing and Closure Bolting. Corrosion of Hom E1.1.2 Stats and No for Boric Same as orros Same or Borie Nuts. ELLI 2 Studs and N Same as for Boric Acid Corrosion of Item E1.1.2 Studs and No Same as for Boric Acid Corrosion of Nuts. Item E1.1.2 Studs and Nuts. (1) Scope of Program: The program relies on preventive The applicable AMP, based on measures and inservice testing (ISI) to manage the e A STREET STREET guidelines given in EPRI TR 102134, is of pitting and crevice corrosion on the component implemented by the plant technical (2) Preventive Actions: Monitoring and maintaining the specifications and relies on minimizing borated water chemistry helps to minimize the rate and impurities by monitoring and effects of component degradation by minimizing the V0 maintaining water chemistry impurities in the borated water. The preventive actions, however, are considered inadequate because of inadvertent introduction of impurities into the system due conditions. Inservice inspection is in conformance with ASME Section XI (edition specified in 10 CFR 50.55a). to unacceptable levels of contaminants in the borated Table IWD 2500-1, test and examination (IN 84-18). (3) Parameters Monitored/ Inspected: The category D-B, and based on the testing AMP monitors the effects of corrosion by source of requirements of 10 CFR 50.55a for chemistry and by ISI to detect leakage and IST to valuate ASME Code Class 3 pumps and valves. component performance. Inspection requirement of and additional NRC staff guidelines of ASME Section XI specify visual VT-2 examinations during NRC Generic Letter 89-04, inservice system leakage and flydrostatic tests of all pressure testing performed in accordance with ASME Subsection IWP (or Operation retaining nd Maintenance Code Subsection

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#### AUXILIARY SYSTEMS VП

	E1. CHEMICAI	, AND VOLUME	CONTROL SI	SIEM (FIESSIE	incu Hatter He	Address	
	Structure and	Region of		Environ-	Aging	Aging	References
Item	Component	Interest	Material	ment	Ellect	rechamsm	
Item	Component	Interest	Material	ment	Effect	-	
-							
E1.6.	Low Pressure Pump	Casing	SS	Chemically Treated Borated Water up to 100°C.	Local Loss of Material	Pitting Corrosion and Cevic Corrosion	NRC GL 89-04 NRC IN 84-18. NRC IN 96-11. Plant Technical Specifications.

AUXILIARY SYSTEMS VII SYSTEM (Pressurized Water Reactor) CHEMICAL AND VOLUME CONT E1 urther Evisti Evaluation and Technical Basis Evaluation ging Management Program (AMP) the from previous page ontinued from previous page) Class 3 components. Based on the requirements of 10 ISTB) for pumps, or other approved ſη, 50.55a for ASME Code Class 1. 2, and 3 pumps and valves program in the plant specifications. and additional guidelines of NRC Generic Letter (GL) 89-04, IST is performed in accordance with ASME Subsection VIIE1-11 IWP (or OM Code Subsection ISTB) (4) Detection of Aging Effects: High concentration impurities at locations having stagnant flow could cause pitting and crevice corrosion under create conditions such as gasket surfaces, and joints. VT-2 examination required by ASME Section XI Table IWD 2500-1 will not detect and crevice corrosion. Therefore, an one time pittiz PRIMARY ection of representative components and susceptib locations should be undertaken to ensure that significant corrosion is not occurring. Based on piping component geometry and fluid flow conditions, susceptible locations MATIEN CHEMISITI PROGRAM can be identified. Follow up actions are based on the inspection results and plant technical specification. (5) Monitoring and Transiting: Sampling of chemistry condition performs periodically. The data provides trending. The results of the one time inspection should be used to dictate future inspection. (6) Acceptance Criteria: femistry monitoring program provides chemical The perameter specification and acceptable levels. (7) Corrective Actions: Plant chemistry control program specifies the target values for chemistry parameter in the borated water. If the specified values are exceeded, corrective actions are initiated to being the chemistry parameters back to normal levels. Corrective actions of the above one time inspection are based on the results of the inspection. (8 & 9) Confirmation Process and Administrative controls: Site QA procedures, review and approval processes, and administrative controls are implemented in accordance with requirements of endix B to 10 CFR Part 50 and will continue to be equate for the period of hearise Tenewal: (10) Operate Experience: Localized corrosion is likely to accelr at crevice geometry where buildup of impurities can occur. The potential exists for introduction of impurities into the system as contaminants in the borated water (IN 84-18). Same as for Stress Corrosion Crac ing of Item E1.2.1 Pipe, Ye Same as for Stress Corrosion Cracking Élement 4 Flanges. of Item E1.2.1 Pipe, Fittings, and Fittings, an should be Flanges. further evaluated

	SI. CHEMICA	L'AND VOLUME	CONTRODUT	01001 (11000)			
Item	Structure and Component	Region of Interest	Material	Environ- ment	Aging Effect	Aging Mechanism	References
E1.7.1 thru E1.7.4	Letdown Heat Exchanger	Tube/Tube Sheet. Studs and Nuts. Channel/ Cover. Channel/ Welds	SS, CS	Tube Side: Chemically Treated Borated Water up to 340°C; Shell Side: Chemically Treated De- mineralize d Water	Cumulative Fatigue Damage	Fatigue	ANSI B31.1.
E1.8.1 thru E1.8.4	Regeneration Heat Exchanger	Tube/Tube Sheet, Studs and Nuts, Channel/ Cover, Channel/ Welds	SS, CS	Tube and Shell Side: Chemically Treated Borated Water up to 340°C.	Cumulative Fatigue Damage	Fatigue	ANSI B31.1.
E1.7.2	Letdown Heat Exchanger	Studs and Nuts	LAS, CS	Air, Leaking Chemically Treated Borated Water	Loss of Material	Boric Acid Corrosion	NRC GL 88-05.
E1.8.2	Regeneration Heat Exchanger	Studs and Nuts	LAS, CS	Air, Leaking Chemically Treated Borated Water	Loss of Material	Boric Acid Corrosion	NRC GL 88-05.
E1.7.5	Letdown Heat Exchanger	Shell	SS	Shell Side: Chemically Treated De- mineralize d Water Tube Side: Chemically Treated Borated Water up to 340°C.	Local Loss of Material	Pitting Corrosion and Crevice Corrosion	Plant Technical Specifications.

#### E1. CHEMICAL AND VOLUME CONTROL SYSTEM (Pressurized Water Reactor)

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E1 CHEMICAL AND VOLUME CONTROL SYSTEM (Pressurized Water Reactor)

Endetined		Further
EXISTING	Evaluation and Technical Basis	Evaluation
Aging Management Program (AMP)	Entique is a time-limit aging analysis (TLAA) to be	Yes
Components have been designed for fatigue for a 40 y design life according to the requirements of ANSI B31.1.	performed for the period of license renewal, check Code limits for allowable cycles (less than 7000 cycles) of thermal stress range.	TLAA
	to be a basis (TT AA) to be	Vec
Components have been designed for fatigue for a 40 y design life according to the requirements of ANSI B31.1.	Fatigue is a time-limit aging analysis (TLAR) to be performed for the period of license renewal, check Code limits for allowable cycles (less than 7000 cycles) of thermal stress range.	TLAA
Same as for Boric Acid Corrosion of Item E1.1.2 Studs and Nuts.	Same as for Boric Acid Corrosion of Item E1.1.2 Studs and Nuts.	NO
Same as for Boric Acid Corrosion of Item E1.1.2 Studs and Nuts.	Same as for Boric Acid Corrosion of Item E1.1.2 Studs and Nuts.	No
Crevice corrosion and pitting can occur at the crevices that are not exposed to the general flowstream or under stagnant flow conditions, such as at the tubesheet-shell joint, and other crevices in the shell side of heat exchanger exposed to the chemically treated demineralized water. The AMP, implemented by plant technical specifications, relies on minimizing impurities by monitoring and maintaining the demineralized water chemistry conditions. Because the diameter of piping is generally less than 4 inches, inservice inspection (ISI) of ASME Section XI Table IWD 2500-1, test and examination category D-B for Class 3 pressure retaining components is usually exempted.	and maintaining the chemistry conditions of the demineralized water for managing the effects of minng corrosion and crevice corrosion on the intender function of the component. (2) Preventive Actions: The program contains chemical parameter specifications, sampling frequency, analysis and corrective actions. Monitoring and maintaining the deminer fixed water chemistry conditions will help to minimize the rate and effects of component degradation. The AMP, however, is inadequate to manage the meets of pitting corrosion and crevice corrosion minch may occur at locations not exposed to the general flowstream or under stagnant flow conditions, such as at the tubesheet-shell joint, where impurities may concentrate over the years. (3) Parameters Monitored/Inspected: Chemical parameters, such as impurities are monitored and controlled. (4) Detection of Aging Effects: High concentration of impurities at locations having stagnant flow conditions. Therefore, and one-time inspection of representative components and susceptible locations should be undertaken to provide additional assurance that significant corrosion is not occuring. This inspection can be visual if the heat arehanger is	NO MANY
HANTER (		12/06/09
·· )	VII E1-19 DRAFT	- 12/06/99

E	1. CHEMICAI	AND VOLUME (		Environ-	Aging	Aging	
Item	Structure and	Region of Interest	Material	ment	Effect	fechanism	References
Item	Component	Interest	Material	ment	Ellect		
E1.8.5	Regeneration Heat Exchanger	Shell	SS	Shell and Tube Side: Chemically Treated Borated Water	Local Loss of Material	Pitting Corrosion and Crevice Corrosion	Plant Technical Specifications.
E1.9.1	Basket Strainer	Studs and Nuts	LAS, CS	Air, Leaking Chemically Treated Borated Water	Loss of Material	Boric Acid Corrosion	NRC GL 88-05.
E1. 10.1	Tank	Studs and Nuts	LAS, CS	Air, Leaking Chemically Treated Borated Water	Loss of Material	Boric Acid Corrosion	NKC GL 88-05.
E1. 10.2 thru E1. 10.4	Tank	Shell, Manway, Penetration/ Nozzles	SS	Chemically Treated Borated Water up to 340°C.	Local Loss of Material	Pitting Corrosion and Crevice Corrosion	IN 84-18. Plant Technical Specifications.

AUXILIANT SISTEMS

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#### VΠ AUXILIARY SYSTEMS

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EI. CHEMICAL AND VOLUME		Further
Existing	Evaluation and Technical Basis	Evaluation
Aging Management Program (runi)	(continued-from previous page)	
	disassembled and may be covered by the plant	
	maintenance program. Ultrasonic thickness	
	measurements could also be used. Follow up aptions are	
	based on the inspection results and plant technical	
	specification. (5) Monitoring and Treading: Sampling of	
	chemistry condition performs periodically. The data	
,	provides trending. The results of the above one time	
	inspection should be used to dictate the future inspection.	
	(6) Acceptance Criteria: The chemistry monitoring	
	program provides chemical parameter specification and	
	acceptable evels. (7) Corrective Actions: Plant chemistry	
,	control program specifies the target values for chemistry	
	parameter in the demineralized water. If the specified	
	Things are exceeded, concective actions are initiated in	
	bring the chemistry parameters back to normal levels	
	Corrective actions of the above one time inspection are	
	based on the results of the inspection. (8 & Steonfirmation	
	Process, and Administrative Controls Site corrective	
	actions program, QA procedures, the review and approval	
	process, and administrative ontrols are implemented in	
	accordance with Appendix B to 10 CFR Part 50	
	requirements and fill continue to be adequate for license	
	renewal. (10) peraning Experience : Clevice condition and	
	pitting can occur at the crevices that are not exposed to the	
	general flowstream of under stagnant new contributions,	<b>F</b>
	the shall side of heat exchanger exposed to the che wally	
	treated demineralized water.	
Come as for Pitting Comesion and	Same as for Pitting Corrosion and Crevice Corrosion of	Yes,
Same as for Filling Corroson and	item E1.7.5 Shell.	Elements 4
Credite Conosidit of Hein D1.1.0 One		should be
		further
		evaluated
		ļ
Same as for Boric Acid Corrosion of	Same as for Boric Acid Corrosion of Item E1.1.2 Studs and	No
Item E1.1.2 Studs and Nuts.	Nuts.	1
		1
		1
	The El 10 Stude and	No
Same as for Boric Acid Corrosion of	Same as for Boric Acia Corrosion of Item E1.1.2 Stuas and	
Item E1.1.2 Studs and Nuts.	Nuts	
]		
		1
Den Ditting Comparing and	Some as for Pitting Corrosion and Crevice Corrosion of	Yes,
Same as for running Corrosion and	Item F1.3.1 Body and Bonnet	Element 4
Crevice Corrosion of Lent 21.5.1 Boug		should be
ana bonnet.		further
		evaluated

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GALL SECTION	TITLE	ITEM NO	PAGE	REVIEWER	COMMENT
VII E1-1	Chemical and Volume Control System	E1.1.1 Through E1.8.4	VII E1-4 through 7, 10, 11, 14, 15, 18 and 19		The system design may preclude Fatigue as an aging mechanism. System and components designed to exceed the requirements of ASME or ANSI for Fatigue should not have this Aging Mechanism and require no further review. (Other comments in this section may apply to Fatigue when it is not precluded by design)
VII E1-2	Chemical and Volume Control System (PWR)	E1.1.1 and E1.1.2	VII E1-4 and 5		Fatigue is listed as an Aging Mechanism for High Pressure Components. The 'Existing AMP' entry states that components have been designed for fatigue for a 40 year design life in accordance with ANSI 31.1. This is simply not a true statement for several reasons. The portions of the CVCS that are subject to Fatigue are those portions that are connected to the RCS. This part of the system was designed in accordance with ANSI B31.7. In any event, there is no aspect of ANSI 31.1 that considers design life in years. If a stress range reduction factor of 1.0 is used in the design analysis, it will have been assumed that the components in question will experience less than 7,000 thermal cycles. There is no explicit correlation to a time period in this evaluation. Also, simply identifying Fatigue as a TLAA does not identify an AMP per se. No information is provided, for example, relevant to Fatigue Monitoring Programs that calculate Cumulative Usage Factors based on partial cycles. This entry provides no useful information to prospective applicants and in fact contains misleading and incorrect statements.
VII E1-3	Chemical and Volume Control System (PWR)	E1.1.2	VII E1-5		For the BAC entry, the 'Evaluation and Technical Basis' element (3) indicates that "One or more studs are removed and examined for evidence of boric acid corrosion". This seems overly prescriptive and may only be necessary in extreme cases. Change "are" to "may be". Replace program with AMA titled 'Boric Acid Corrosion Program' in lieu of the existing listed program.

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CALL SECTION	TITLE	ITEM NO.	PAGE	REVIEWED	COMMENT
VII E1-4	Chemical and Volume Control System	E1.2.1, 1.2.2, 1.4.1, 1.4.2, 1.5.1 and 1.5.2	VII E1-6, 7, 10, 11, 14 and 15		Fatigue is listed as an Aging Mechanism for the CVCS Low Pressure Piping, Low Pressure Valves and Bolting and High Pressure Pump. These components are not subjected to high temperatures or thermal cycles that could cause Fatigue; this Aging Mechanism should not be listed for these items. This position was
VII E1-5	Chemical and Volume Control System (PWR)	E1.2.1 and E1.2.2	VII E1-6 and 7		Fatigue is listed as an Aging Mechanism for Low Pressure Components. The comment above for High Pressure Components relating to the time-related design life in the statement in the <b>'Existing AMP'</b> entry applies here also. Also, CCNPP made the argument that Class 2 and 3 piping Fatigue was not a TLAA based on a similar argument: There is no aspect of ANSI 31.1 that considers design life in years. If a stress range reduction factor of 1.0 is used in the design analysis, it will have been assumed that the components in question will experience less than 7,000 thermal cycles. There is no explicit correlation to a time period in this evaluation, so the TLAA criterion of applying to the 40-year service life cannot be met. The NRC considered the evaluation performed by BGE to demonstrate that Fatigue was not Plausible for Class 2 and 3 piping constituted the TLAA avaluation and a stress 2
VII E1-6	Chemical and Volume Control System	E1.2.1, 1.3.1, 1.4.1, 1.5.1, 1.6.1, 1.7.5, 1.8.5, 1.10.2, 1.10.3 and 1.10.4	VII E1-6 through 21		<b>'Evaluation and Technical Basis'</b> for corrosion of Stainless Steel should credit only the chemistry control program in Borated water systems with well controlled chemistry parameters. This would justify a 'no' in the Further Evaluation section. 'One time inspections' should not be required. Refer to AMA titled 'Chemistry Program (Primorn)' in line of the part of the line of
VII E1-7	Chemical and Volume Control System	E1.2.1	VII E1-8 Through 11		Low Pressure Piping Stress Corrosion Cracking identifies the Environment as External with Heat Tracing and internal with treated water. The Region of Interest is identified as Low Pressure Piping up to 100°C. The use of adhesives with halogens would appear to be a 'Degradation induced by human activities' (Generic Licensing Renewal Issue # 98-0013) and not a real Aging concern. There should not be any action in the Further Evaluation column.

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CALL SECTION	TITLE	ITEM NO	PAGE	REVIEWER	COMMENT
					More correctly this item should be deleted as design and material controls consistent with Reg. Guide 1.43 preclude cracking.
VII E1-8	Chemical and Volume Control System (PWR)	E1.2.1 and E1.4.1	VII E1-8, 9, 14 and 15		SCC is listed as an Aging Mechanism for Low Pressure Components. (This item has been previously commented on. If the this Aging Mechanism is not deleted them this comment applies.) The instance of SCC at CCNPP from which this entry derives was a plant-specific, one time only event. It is not apparent how this 'AMP' (the replacement of the heat trace cement) will provide any useful information to other prospective applicants. In addition, the plant chemistry program should not be listed as an AMP in this case because the condition of the process fluid has no bearing on the conditions required for external SCC. Leaking process fluid provided the aqueous environment necessary for initiation of SCC, and the level of any impurities in the CVCS fluid was not a contributing factor.
VII E1-9	Chemical and Volume Control System	E1.4.1	VII E1-14 and 15		Low Pressure Valves Stress Corrosion Cracking identifies the Environment as External with Heat Tracing and internal with treated water. The Region of Interest is identified as Low Pressure Valves up to 100°C. The use of adhesives with halogens would appear to be a 'Degradation induced by human activities' (Generic Licensing Renewal Issue # 98-0013) and not a real Aging concern. There should not be any action in the Further Evaluation column. More correctly this item should be deleted as design and material controls consistent with Reg. Guide 1.43 preclude cracking.

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CALL SECTION	TITLE	ITEM NO	PAGE	REVJEWER	COMMENT
VII E1-10	Chemical and Volume Control System	E1.5.1, E1.5.2 E1.6.1 and E1.6.2	VII E1-14, 15, 16 and 17		The <b>'Environment'</b> for High Pressure Pump list temperatures up to 340°C. The <b>'Environment'</b> for Low Pressure Pump is listed to 100°C. The High Pressure Pumps are not subjected to high temperatures during normal operations or even during Post-accident conditions. The Low Pressure Pumps do see higher temperatures but not above 200°C. Revise these two <b>'Environment'</b> entries to match their application.
VII E1-11	Chemical and Volume Control System (PWR)	E1.5.1	VII E1-14, 15 and 17		Crevice Corrosion/Pitting is listed as an Aging Mechanism for the High Pressure Pump. ISI/IST is listed as an <b>'Existing AMP'</b> but the <b>'Evaluation and Technical Basis'</b> section appears to indicate that ISI/IST (in the guise of VT-2 exams) is not adequate to discover Crevice Corrosion/Pitting. A one-time inspection is indicated instead, which in essence makes this entry the same as all the other Crevice Corrosion/Pitting entries in this section. Since ISI/IST is not actually to be credited, it should not be listed. Additionally the 'AMP' column lists the Secondary Chemistry program 102134 instead of the Primary program 105714. Refer to AMA titled 'Chemistry Program (Primary)' in lieu of the existing listed program.

NOTES: 1. This comment has generic implications regarding other sections of the GALL Report.

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# E2. Standby Liquid Control System (Boiling Water Reactor)

- E2.1 Piping
- E2.2 Solution Storage Tank
- E2.3 Solution Storage Tank Heaters
- E2.4 Pump Suction Valves
- E2.5 Injection Pumps
- E2.6 Relief Valves
- E2.7 Injection Valves
- E2.8 Containment Isolation Valves
- E2.9 Injection Sparger
- E2.10 Pump Suction Valves

## E2. Standby Liquid Control System (Boiling Water Reactor)

#### System, Structures, and Components

The system, structures, and components included in this table comprise the standby liquid control system, which serves as a backup reactivity control system in all boiling water reactors (BWRs) in the U.S. The major components of this system are the piping, solution storage tank, solution storage tank heaters, pump suction valves, injection pumps, relief valves, injection valves, containment isolation valves, injection sparger, and pump suction valves. All of these components operate in contact with a Na pentaborate solution and are fabricated of austenitic stainless steel. Based on U.S. Nuclear Regulatory Commission Regulatory Guide 1.26, "Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants," all components in the standby liquid control system are classified as Group B Quality Standards.

Pumps and valves are considered to be active components; seats, discs, and other valve and pump internals should be covered by the plant maintenance program.

#### System Interfaces

The system that interfaces with the standby liquid control system is the BWR reactor pressure vessel (Table IV.A1). If used, the standby liquid control system would inject sodium pentaborate solution into the pressure vessel near the bottom of the reactor core.

	Character and	Borics of		Environ-	Ading	Adind	
Item	Component	Interest	Material	ment	Effect	Mechanism	References
Item E2.1	Structure and Component Piping	Region of Interest ID surfaces	Material Stainless Steel	Environ- ment Sodium pentaborat e solution at 70-90°C (=5000 ppm B)	Aging Effect Crack Initiation and Growth	Aging Mechanism Stress Corrosion Cracking (SCC)	References ASME Section XI, 1989 Edition. Regulatory Guide 1.44. NUREG/CR-6001. Plant Technical Specifications
E2.2	Solution Storage Tank	ID surfaces	Stainless Steel	Sodium pentaborat	Crack Initiation	Stress Corrosion Cracking	ASME Section XI, 1989 Edition. Regulatory Guide
				e solution at 70- 150°C (=1100 ppm B)	and Growth	(SCC)	1.44. NUREG/CR-6001

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E2. STANDBY LIQUID CONTROL SYSTEM (Boiling Water Reactor)

AUXILIARY SYSTEMS VII STANDBY LIQUID CONTROL SYSTEM (Boiling Water Reactor) E2. Further Existing Evaluation Evaluation and Technical Basis Aging Management Program (AMP) (1) Scope of Program: The program includes preventive Guidelines of Regulatory Guide (RG) 1.44 measures to mitigate SCC of SS components, and inser to avoid sensitization of stainless steels inspection (ISI) to monitor the effects of SCC on the (SSs) and inservice inspection in intended function of piping and fittings and connected conformance with ASME Section XI lines. (2) Preventive Actions: Selection of patterial in (edition specified in 10 CFR 50.55a). compliance with the requirements of Reculatory Guide Subsection IWC, Table IWC 2500-1, (RG) 1.44 prevent or mitigate SCC, tiso, control of examination category C-F-1 for halogens, oxygen, and other is purities in the water in pressure retaining welds in austenitic accordance with Plant Technical Specifications to mitigate the potential or SCC. (3) Parameters stainless steel and high alloy piping. Water chemistry controls in accordance Monitored/Inspected: The parameters monitored are with Plant Technical Specifications. concentrations of impurities in the water to reduce the VIIE2potential for stress corrosion cracking at the weld heatcted zones. Periodic surface and volumetric pections are required for Class 2 piping welds. Requirements for training and qualification of perso and performance demonstration for procedures PRIMAR equipment is in conformance with Appendice VII and VIII of ASME Section XI, or any other formal program approved by the NRC. (4) Detection offiging Effects: Degradation of the piping due to the can not occur without crack initiation. ASME Section XI inspection requires examination of only the welds and weld regions, and the potential of cracking of susceptible SS components and cladding remote from welds is not addressed. However, no cracking associated with Na pentaborate solutions, either INSERVICE INSPECTION PROGRAM SEE CHANTED at or a say from welds, has been reported in nuclear plants NTATE /CR-6001). (5) Monitoring and Trending: Inspection schedule in accordance with IWC-2400 provides timely detection of cracks. (6) Acceptance Criteria: Any IGSCC degradation is evaluated in accordance with IWC-3100 by comparing ISI results with the acceptance standards of IWO \$400. (7) Corrective Actions: Repair and replacement are in conformance with IWA-4000 and IWC-3453, and reexamination in accordance with equirements of IWA-2200. (8 & 9) Confirmation Process and Administrative Controls: Site QA procedures, review and approval processes, and ad inistrative controls are implemented in accordance with requirements of Appendix B to 10 CFR Part 50 and will continue to be adequate for the period of licens renewal. (10) Operating Experience: No occurrences of stress corrosion cracking in piping and other components in standby liquid control systems base ever been reported (NUREG/CR-6001). Cracking tes been seen infrequently in fuel storage pool systems in contact with boric acid solutions, and the semary cause has been unacceptable levels of contaminants in the boric acid. However, these solutions are not directly comparable to Na pentaborate solutions because of the higher pH (near neutral) and my buffered characteristics of the latter. The as effects of Stress Corresion Cracking of Internal Same as Same as effects of Stress Corrosion. Surfaces on tem E2.1: Piping Cracking of Internal Surfaces on Item E2.1: Piping.

#### AUXILIARY SYSTEMS VП

E	2. STANDBY	LIQUID CONTRO	JL SYSTEM (B	ouing water	REACION	0.41.5.4	
Item	Structure and Component	Region of Interest	Material	Environ- ment	Aging Effect	Aging Mechanism	References
E2.3	Solution Storage Tank Heaters	Surfaces in contact with Na pentaborate solution	Stainless Steel	Sodium pentaborat e solution at 70-90°C (#1100 ppm B)	Crack Initiation and Growth	Stress Corrosion Cracking (SCC)	ASME Section XI, 1989 Edition. Regulatory Guide 1.44. NUREG/CR-6001
E2.4	Pump Suction Valves	Surfaces in contact with Na pentaborate solution	Stainless Steel	Sodium pentaborat e solution at 70-90°C (=1100 ppm B)	Crack Initiation and Growth	Stress Corrosion Cracking (SCC)	ASME Section XI, 1989 Edition. Regulatory Guide 1.44. NUREG/CR-6001
E2.5	Injection Pumps	Surfaces in contact with Na pentaborate solution	Stainless Steel	Sodium pentaborat e solution at 70-90°C (=1100 ppm B)	Crack Initiation and Growth	Stress Corrosion Cracking (SCC)	ASME Section XI, 1989 Edition. Regulatory Guide 1.44. NUREG/CR-6001
E2.6	Relief Valves	Surfaces in contact with Na pentaborate solution	Stainless Steel	Sodium pentaborat e solution at 70-90°C (≈1100 ppm B)	Crack Initiation and Growth	Stress Corrosion Cracking (SCC)	ASME Section XI, 1989 Edition. Regulatory Guide 1.44. NUREG/CR-6001
E2.7	Injection Valves	Surfaces in contact with Na pentaborate solution	Stainless Steel	Sodium pentaborat e solution at 70-90°C (≈1100 ppm B)	Crack Initiation and Growth	Stress Corrosion Cracking (SCC)	ASME Section XI, 1989 Edition. Regulatory Guide 1.44. NUREG/CR-6001
E2.8	Containment Isolation Valves	Surfaces in contact with Na pentaborate solution	Stainless Steel	Sodium pentaborat e solution at 70-90°C (≈1100 ppm B)	Crack Initiation and Growth	Stress Corrosion Cracking (SCC)	ASME Section XI. 1989 Edition. Regulatory Guide 1.44. NUREG/CR-6001
E2.9	Injection Sparger	Surfaces in contact with Na pentaborate solution	Stainless Steel	Sodium pentaborat e solution at 70-90°C (~1100 ppm B)	Crack Initiation and Growth	Stress Corrosion Cracking (SCC)	ASME Section XI, 1989 Edition. Regulatory Guide 1.44. NUREG/CR-6001
E2.10	Pump Suction Valves	Surfaces in contact with Na pentaborate solution	Stainless Steel	Sodium pentaborat e solution at 70-90°C (=1100 ppm B)	Crack Initiation and Growth	Stress Corrosion Cracking (SCC)	ASME Section XI, 1989 Edition. Regulatory Guide 1.44. NUREG/CR-6001

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Further Existing Evaluation Evaluation and Technical Basis Aging Management Program (AMP) Same as effects of Stress Corrosion Cracking of Internal No Same as effects of Stress Corrosion Cracking of Internal Surfaces on Item Surfaces on Item E2.1: Piping. E2.1: Piping. Same as effects of Stress Corrosion Cracking of Internal No Same as effects of Stress Corrosion Cracking of Internal Surfaces on Item Surfaces on Item E2.1: Piping. E2.1: Pipina. Same as effects of Stress Corrosion Cracking of Internal No Same as effects of Stress Corrosion Surfaces on Item E2.1: Piping. Cracking of Internal Surfaces on Item E2.1: Piping. Same as effects of Stress Corrosion Cracking of Internal No Same as effects of Stress Corrosion Cracking of Internal Surfaces on Item Surfaces on Item E2.1: Piping. E2.1: Piping. Same as effects of Stress Corrosion Cracking of Internal No Same as effects of Stress Corrosion Surfaces on Item E2.1: Piping. Cracking of Internal Surfaces on Item E2.1: Piping. Same as effects of Stress Corrosion Cracking of Internal No Same as effects of Stress Corrosion Surfaces on Item E2.1: Piping. Cracking of Internal Surfaces on Item E2.1: Piping. Same as effects of Stress Corrosion Cracking of Internal No Same as effects of Stress Corrosion Surfaces on Item E2.1: Piping. Cracking of Internal Surfaces on Item E2.1: Piping. Same as effects of Stress Corrosion Cracking of Internal No Same as effects of Stress Corrosion Cracking of Internal Surfaces on Item Surfaces on Item E2.1: Piping. E2.1: Piping.

## E2. STANDBY LIQUID CONTROL SYSTEM (Boiling Water Reactor)

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CALL SEATION	TITLE	ITEM NO.	PAGE	REVIEWER COMMENT
VII E2-1	SBLC (BWR)	E2.1	VII E2-4	The concentrations of sodium pentaborate will vary in
		Thru	Thru	different BWRs.
		E2.10	VII E2-7	Element 2 - Preventive Actions: Every plant may not
				have Tech Specs to monitor impurities in the "water".
				What is the "water"?

## E3. Reactor Water Cleanup System

- E3.1 Piping
  - E3.1.1 Pipe and Fittings (beyond isolation valves)
- E3.2 Recirculation Pump
  - E3.2.1 Bowl/Casing
  - E3.2.2 Cover
  - E3.2.3 Seal Flange
  - E3.2.4 Closure Bolting
- E3.3 Valves (Quality Group A)
  - E3.3.1 Body
  - E3.3.2 Bonnet
  - E3.3.3 Seal Flange
  - E3.3.4 Closure Bolting
- E3.4 Regenerative Heat Exchanger
  - E3.4.1 Tubing
  - E3.4.2 Shell
- E3.5 Non-Regenerative Heat Exchanger
  - E3.5.1 Tubing
  - E3.5.2 Shell
- E3.6 Filter/Demineralizer
  - E3.6.1 Internals

### E3. Reactor Water Cleanup System

### System, Structures, and Components

The system, structures, and components included in this table comprise the reactor water cleanup system, which provides for cleanup and particulate removal from the recirculating cooling water in all boiling water reactors (BWRs) in the US. Portion of the reactor water cleanup system, extending from the coolant recirculation system up to the second isolation valve outside the containment, forms the primary pressure boundary, and is classified as Group A Quality Standards. The remainder of the system can be isolated from the reactor and is subject to much less stringent design and inspection requirements for the balance of plant. The aging management program for isolation valves in the reactor water cleanup system is reviewed in Table V C.

Pumps and valves are considered to be active components and pump internals, and seats, discs, and other valve items should be covered by the plant maintenance program.

## System Interfaces

The systems that interface with the BWR reactor water cleanup system include the reactor coolant pressure boundary (Table IV C1) and the closed cycle cooling water system (Table VII C2).

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## VII

	Structure and	Region of	Matarial	Environ-	Aging	Aging	References
Item	Component	Interest		Orugenated	Crack	SCC	There is a second secon
5.1.1	Piping	Fittings (beyond second isolation valve)	304, 316, or 316NG	Water up to 288°C	Initiation and Growth	IGSCC	Plant Technical Specifications
						Þ	
<u></u>	Pinind	Pining and	SS. Types	Oxygenated	Cumulative	Fatigue	ANSI B31.1.
	, .he	Fittings (beyond second	304, 316, or 316NG	Water up to 288°C	Fatigue Damage		
		value					
E3.2.1, E3.2.2	Reactor Water Cleanup Pump	Bowl/Casing, Cover	Cast Austenitic Stainless Steel (CASS) SA351 CF-8 or CF-8M	Oxygenated Water up to 288°C	Loss of Fracture Toughness	Thermal Embrittle- ment	-

AUXILIARY SYSTEMS E3. REACTOR WATER CLEANUP SYSTEM

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#### vп AUXILIARY SYSTEMS

Existing Aging Management Program (AMP) Auidelines of NUREC-0313, Rev. 2 and IRC Generic letter (GL) 88-01 and its Supplement 1. Inspection requirements are governed by plant-specific aging nanagement programs.	Evaluation and Technical Basis (1) Scope of Program: The program includes preventive measures to mitigate stress corrosion cracking (SCC) and inservice inspection (ISI) to monitor the effects of SCC on intended function of the pump. NUREG-0313 and GL 88-	Further Evaluation Yes, Elements 3 through 7
Aging Management Program (AMP) Guidelines of NUREG-0313, Rev. 2 and IRC Generic letter (GL) 88-01 and its Supplement 1. Inspection requirements re governed by plant-specific aging nanagement programs.	Evaluation and Technical Basis (1) Scope of Program: The program includes preventive measures to mitigate stress corrosion cracking (SCC) and inservice inspection (ISI) to monitor the effects of SCC on intended function of the pump. NUREG-0313 and GL 88-	Evaluation Yes, Elements 3 through 7
Guidelines of NUREG-0313, Rev. 2 and IRC Generic letter (GL) 88-01 and its Supplement 1. Inspection requirements re governed by plant-specific aging nanagement programs.	(1) Scope of Program: The program includes preventive measures to mitigate stress corrosion cracking (SCC) and inservice inspection (ISI) to monitor the effects of SCC on intended function of the pump. NUREG-0313 and GL 88-	Yes, Elements 3 through 7
NRC Generic letter (GL) 88-01 and its Supplement 1. Inspection requirements re governed by plant-specific aging management programs.	measures to mitigate stress corrosion cracking (SCC) and inservice inspection (ISI) to monitor the effects of SCC on intended function of the pump. NUREG-0313 and GL 88-	Elements 3 through 7
Supplement 1. Inspection requirements re governed by plant-specific aging nanagement programs.	inservice inspection (ISI) to monitor the effects of SCC on intended function of the pump. NUREG-0313 and GL 88-	through 7
re governed by plant-specific aging nanagement programs.	intended function of the pump. NUREG-0313 and GL 88-	I about the
nanagement programs.		i snoma be
	01, respectively, describe the technical basis and staff	further
	guidance regarding the problem of IGSCC in BWRs.	evaluated
	(2) Preventive Actions: Mitigation of IGSCC is by selection	
	of material considered resistant to sensitization and	1
	IGSCC, e.g., low-carbon grades of cast SSs and weld metal,	
	with a maximum carbon of 0.035% and minimum 7.5%	
-	ferrite. Also, hydrogen water chemistry and stringent	1
	control of conductivity is used to inhibit IGSCC. However,	
	high-carbon grades of cast SS, e.g., CF-8 and CF-8M may	1
	be susceptible to SCC. (3) Parameters	
	Monitored/Inspected: Governed by plant-specific aging	1
	management program. (4) Detection of Aging Effects:	1
	Governed by plant-specific aging management program.	
	(5) Monitoring and Trending: Governed by plant-specific	
	aging management program. (6) Acceptance Criteria:	
	Governed by plant-specific aging management program.	
	(7) Corrective Actions: Governed by plant-specific aging	1
	management program. (8 & 9) Confirmation Process and	
	Administrative Controls: Site QA procedures, review and	
	approval processes and administrative controls are	
	implemented in accordance with requirements of	
	Appendix B to 10 CFR Part 50 and will continue to be	
	adequate for the period of license renewal. (10) Operating	1
	Experience: The comprehensive AMP outlined in NUREG-	
	0313 and GL 88-01 is based on substantial effort in	
	research and development, and industry	
	recommendations developed in response to NRC	
	communications. The program addresses improvements	
	in all elements that cause IGSCC, e.g. susceptible	
	(sensitized) material significant tensile stress, and an	
	addressive environment and has provide the fective mean	
· · · · · · · · · · · · · · · · · · ·	of according structural integrity of atistenitic stables	
$\sim \sim \sim \sim$	reel companyots	
among anto have desided at	Fatigue is a time-limited aging analysis (TLAA) to be	Yes
required for fations for a 40 y design	performed for the period of license renewal, and Generic	TLAA
ife according to the requirements of	Safety Issue [GSI]-190 is to be addressed.	
SME Section III (edition energified in		
O CFR 50 55a) or other evaluations	DELEIE	1
ased an cumulative meade factor (CUF)		
ascu al culturative isage factor (COF).	(1) Solno & Polation : The station is and the De Cartes	N
terrorin ocalions for a comprehensive	(CI) QV17 nrmide accurate that nian exerting	
HIDEC 1224 on resolution of Const	comprehensive bolting integrity pro-rams have been	Γ.
VUREG-13 on resolution of Generic	implemented to ensure holting reliability. The NDC staff	1
salely issue 29 and implemented	recommendations and duidelines for a comprehensive	
nrough NKC Generic Letter 91-1/;	bolting integrity program is delineated in MUDEC 1920	
aditional details on bolting integrity	and the inductor's technical basis for the produm is	
WITH THAT IN MUUT ALL S'ALL ANA INCAMPAN	and the industry's technical basis for the program is	
inimico in erro in-5705, and inservice	1 Outlined in EPKI INF-3/09. [2] Preventive Actions:	<b>i</b> (
nspection in conformance with ASME	Colorising of bolting motorial	
nspection in conformance with ASME Section XI (edition specified in 10 CFR	Selection of bolting material ACIETE	
nspection in conformance with ASME Section XI (edition specified in 10 CFR i0.55a),	Selection of bolting material DELETE	
nspection in conformance with ASME Section XI (edition specified in 10 CFR 50.55a),	Selection of bolting material DELETE	
nspection in conformance with ASME Section XI (edition specified in 10 CFR 50.55a).	Selection of bolting material	
F3. REACTOR WATER CLEANUP SYSTEM

	Structure and	Region of	Motorial	Environ-	Aging Effect	Aging Mechanism	References
Item	Component	Interest	Material	ment	Ellect	VIECHAIIISIII	Telefences
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#### VII AUXILIARY SYSTEMS E3. REACTOR WATER CLEANUP SYSTEM



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#### E3. REACTOR WATER CLEANUP SYSTEM

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Existing		Further
Aging Management Program (AMP)	Evaluation and Technical Basis	Evaluation
• · · · · · · · · · · · · · · · · · · ·	for the second from provide the second	
	startup following each refueling outage. and hydrosenic	
	test is conducted at or near the end of each inspection	
	interval. (6) Acceptance Criteria: Appendix in closure	
	bolting are evaluated in accordance with IWB-3100 by	
	comparing ISI results with the acceptance standards of	
	IWB-3400 and IWB-3545 and 3517. Any relevant	
	conditions that may be detected during the leakage and	ļ
	hydrostate tests are compared with the acceptance	
	standards of IWB-3522. (1) confectible Actions, hepen and	
	nuidelines and recommendations of EPRI NP-5769. (9)	]
	Confirmation Process and Administrative Controls: Site	
	QA procedures, review and approval processes, and	
	administrative controls are implemented in accordance	1
	with requirements of Appendix B to 10 CFR Part 50 and	
	will continue to be adequate for the period of license	1
	renewal. (10) Operating Experience: Significant number of	
	incidents have been reported on bolts and mine and	1
	I miled of become degraded because of borne actu message of	· ·
and the second s	Building integrity programs developed and implemented in	
	accordance with commitments made in response to HRS	]
	communications on bolting, events have provided effective	
	means of ensuring bolting reliability.	
Same as the effect of uppar on Item E3.2:	Same as the effect of wear on Item E3.2: Closure Bolting for	No
Closure Bolting for Recirculation Pump.	Recirculation Pump.	1 de
•••••••••••••••••••••••••••••••••••••••	11159-5	l G
		1.17
Components have been designed or	Fatigue is a time-limited aging analysis (ILAA) to be	TIAA
evaluated for fatigue for a 40 y design	performer for the performancense renewal, and Generic	ILAA
life, according to the requirements of	alen issue 190 is to be addressed:	
ASME Section III (edition specified in		
10 CFR 50.55a), Subsection NB, of ANSI		
B31.1, of other evaluation vasco on		
Annespecific aging management	Plant-specific aging management program to be	Yes
rogram.	evaluated.	no AMP
F0		l
Same as the effect of crack initiation	Same as the effect of crack initiation and growth on Item	Yes.
and growth on Item E3.2: bowl, casing,	D3.2: bowl casing, and there for reactor water cleanup	through 7
and cover for recirculation pump.		should be
	// `= ` /	further
•		evaluated
O have been designed on	Fatigue is a time-limited aging analysis (TLAA) to be	Yes
Components have been designed or	performed for the period of license renewal, and Generic	TLAA
He according to the requirements of	Safety Issue (GSI)-190 is to be addressed.	1
ASME Section III (edition specified in		
10 CFR 50.55a) or other evaluations		
based on cumulative usage factor (CUF).		<b>}</b>
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			l'and the second					<b>)</b>	
	A CONTRACT							<u> </u>	
		UXILIARY SYS	TEMS WATER CLEAN	IIP SYSTEM					
H		Structure and	Region of		Environ-	Aging	Aging		
	Item	Component	Interest	Material	ment	Effect	Mechanism	References	
	E3.3.4	Valves	Closure	HSLAS	Air,	Loss of	Stress	NUREG-1339.	
	~	(Quality	Bolting		Leaking	Preload	Relaxation	EPRI NP-5769. NBC CL 91-17	
Ĩ		Group D)			Water		-	IEB 82-02.	
1								NRC Bull 89-02.	
					4			NRC IN 90-68 S1.	
			4	1-7				ASME Section XI,	
		77-1			Air	Cumulative	Fatigue	ASME Section III.	
	E3.3.4	Vaives	Bolting	ao no -	Leaking	Fatigue	· uuguo	1989 Edition.	
	2	Group D)			Oxygenated	Damage		ANSI B31.1.	
4		•		51	Water	Age:		GSI-190.	
								•	C.C.
2					-				
¥	F341	Regenerative	Tubing	ss	Oxygenated	Crack	SCC.	NRC GL 8-01.	
		Heat	5	1	Water	Initia	IGSCC	NRC GL 88-01, S1.	
4		Exchanger			200°C 201	d on 1			
Ĵ					max.		<b>[</b>		
<i>1</i>									
Ĩ.	E3.4.1	Regenerative	Tubing	ss	Oxygenated	Cumulative	Fatigue	ASME Section III,	
de la compañía de la comp		Heat			water at	Fatigue		ANSI B31.1.	
Ì	34.	Exchanger			10 MPa	Damage		GSI-190.	
Ĭ					max.				
1									
1				TICLAS	Orgenerated	Crack	SCC	NUREG-0313.	
	E3.4.2	Regenerative	Shell	SS Cladding	water at	Initiation	IGSCC	Rev. 2.	
3		Exchanger			288°C and	and Growth		NRC GL 88-01.	
K		3			10 MPa			NRC GL 88-01, SI	
¥.					max.			NRC IN 90-29.	
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E3. REACTOR WATER CLEAN Existing	Evaluation and Technical Basis	Further Evaluation
Same as the effect of stress relaxation on Item E3.2 Closure Bolting for Recirculation Pump.	Same as the effect of wear on Item C1.2.4 Closure Bolting for Recirculation Pump.	No
Components have been designed or valuated for fatigue for a 40 y design life, according to the requirements of ASME Section III (edition specified in 10 CFR 50.55a), Subsection NB, or ANSI B31.1, or other evaluations based on	Fatigue is a time-limited aging analysis (TLAA) to be performed for the period of license renewal, and Generic Safety Issue (GSI)-190 is to be addressed.	Yes TLAA
cumulative usage factor (CUF). Same as the effect of stress corrosion cracking on Item E3.1: Piping and Fittings beyond second Isolation Valve.	Same as the effort of suess corrosion cracking on Item E3.1: Piping and Fittings beyond second Isolation Valve.	Yes. Elements 3 through 7 should be further evaluated
Components have been designed or evaluated for fatigue for a 40 y design life, according to the requirements of ASME Section III (edition specified in 10 CFR 50.55a), Subsection NB, or ANSI B31.1, or other evaluations based on cumulative usage factor (CUF).	Fatigue is a time-limited aging analysis (TLAA) to be performed for the period of license renewal, and Generic Safety Issue (GSI)-190 is to be addressed.	Yes TLAA
Materials selection in accordance with guidelines of NUREG-0313, Rev. 2 and requirements of Regulatory Guide 1.43 for the control of stainless steel cladding of low-alloy steels. Inservice inspection governed by plant-specific aging management program.	<ul> <li>(1) Scope of Program: The program is focused on managing the effects of SCC of SS cladding on the intended function of the heat exchanger vessel. NUREG-0313 and GL 88-01, respectively, describe the technical basis and staff guidance regarding the problem of IGSCC in BWRs.</li> <li>(2) Preventive Actions: Mitigation of IGSCC is by selection of material considered resistant to sensitization and IGSCC. e.g., low-carbon grades of austentitic SSs and weld metal, with a maximum carbon of 0.035% and minimum 7.5% ferrite in weld metal. Furthermore, hydrogen water chemistry and stringent control of conductivity is used to inhibit IGSCC. (3) Parameters Monitored/ Inspected: Governed by plant-specific aging management program.</li> <li>(4) Detection of Aging Effects: Governed by plant-specific aging management program. (6) Acceptance Criteria: Governed by plant-specific aging management program. (7) Corrective Actions: Governed by plant-specific aging management program. (8 &amp; 9) Confirmation Process and Administrative Controls: Site QA procedures, review and approval processes, and administrative controls are implemented in accordance with requirements of Appendix B to 10 CFR Part 50 and will continue to be adequate for the period of license renewal.</li> </ul>	Elements 3 through 7 should be further evaluated

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E	3. REACTOR Structure and	Region of	NUP SYSTEM	Environ-	Aging	Aging Mechanism	References
<u>i</u> ten	Component	Interest	Material	ment	Elicer		· · ·
						•	
			-				
23.4.2	Regenerative Heat Exchanger	Shell	SS	Oxygenated water at 289°C and 1 V IPa max	tumulative tigue amage	Fatigue	ASME Section III, 1989 Edition. ANSI B31.1. GSI-190.
E3.5.1	Non- Regenerative Heat Exchanger	Tubing		Oxygenated water at 288°C and 10 MPa max.	Crack Initiation and Growth	SCC, IGSCC	NUREG-0313. Rev. 2. NRC GL 8-01. NRC GL 88-01, S1.
E3.5.1	Non- Regenerative Heat Exchanger	Tubing	SS	Oxygenated water at 288°C and 10 MPa max.	Cumulative Fatigue Damage	Fatigue	ASME Section III, 1989 Edition. ANSI B31.1. GSI-190.
E3.5.2	Non- Regenerative Heat Exchanger	Shell	HSLAS with SS Cladding	Oxygenated water at 188°C and 1 MPa max.	Crack Initiation and Growth	SCC, IGSCC	NUREG-0313, Rev. 2. NRC GL 88-01. NRC GL 88-01, S1. NRC IN 90-29.
E3.5.2	Non- Regenerative Heat Exchanger	Shell	SS	Oxygenated water at 188°C and 1 MPa max	Cumulative Fatigue Damage	Fatigue	ASME Section III. 1989 Edition. ANSI B31.1. GSI-190.
76.6.1	6.6	Internals	ss	Oxygenated	l Crack	SCC,	NUREG-0313.
~	Demineralize		I E	66°C and 1 MPa	and Growth		NRC GL 88-01. NRC GL 88-01, S1. NRC IN 90-29.
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Existing Aging Management Program (AMP)	Evaluation and Technical Basis	Evaluation
	(continued from previous page) (10) Operating Experience: Cracking has occurred in BWR pressure vessel weld clad and the adjacent heat-affected zone of the base metal, as described in IN 90-29. The comprehensive AMP outlined in NUREG-0313 and GL 88- 01 is based on substantial effort in research and development, and industry recommendations developed in response to NRC communications. The program addresses improvements in the three elements that cause IGSCC, e.g., a susceptible (sensitized) material, significant tensile stress, and an aggressive environment, and has provided effective means of energy structural integrity of austenitic stainless steel pittered	Yes. Elements 3 through 7 should be further evaluated
Components have been designed or evaluated for fatigue for a 40 y design life, according to the requirements of ASME Section III (edition specified in 10 CFR 50.55a), Subsection NB, or ANSI B31.1, or other evaluations based on cumulative usage factor (CUF).	Fatigue is a time-limited aging antiysis (TLAA) to be performed for the et od to license renewal, and Generic Safety Issue (Obi)-1500, to be addressed.	Yes TLAA
Same as the effect of stress corrosion cracking on Item E3.1: Piping and Fittings beyond second Isolation Valve.	Semilarian State of Stress corrosion cracking on Item E3.1: Piping and Fittings beyond second Isolation Valve.	Yes. Elements 3ª through 7 should be further evaluated
Components have been designed or evaluated for fatigue for a 40 y design life, according to the requirements of ASME Section III (edition specified in 10 CFR 50.55a), Subsection NB, or ANSI B31.1, or other evaluations based on cumulative usage factor (CUF).	Fatigue is a time-limited aging analysis (TLAA) to be performed for the period of license renewal, and Generic Safety Issue (GSI)-190 is to be addressed.	Yes TLAA
Same as the effect of stress corrosion cracking on Item E3.4: Regenerative Heat Exchanger Shell.	Same as the effect of stress corrosion cracking on Item E3.4: Regenerative Heat Exchanger Shell.	Yes. Elements 3 through 7 should be further evaluated
Components have been designed or evaluated for fatigue for a 40 y design life, according to the requirements of ASME Section III (edition specified in 10 CFR 50.55a), Subsection NB, or ANSI B31.1, or other evaluations ared on cumulative insagementor (CUI).	Fatigue is a time-limited aging analysis (TLAA) to be performed for the period of license renewal, and Generic Safety Issue (GSI)-190 is to be addressed.	Yes TLAA
Some as the lifect of stress corresion cracking on Item E3.4: Regenerative rHeat Exchanger Shell.	Same as the effect of stress corrosion cracking on hem E3.4 Regenerative Heat Exchanger Shell.	Elements 3 through 7 should be further evaluated

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CALL SECTION	TITLE	ITEM NO	PAGE	REVIEWER	COMMENT
VII E3-1	Auxiliary Systems Reactor Water Cleanup System	Ali			Inconsistent treatment of valves. Some sections address body, bonnet, seal flange and closure bolting while other sections address only body & bonnet. Section VIII B2.2 addresses only valve body and bolting, and does not address valve bonnet.
VII E3-2	Auxiliary Systems Reactor Water Cleanup System	E3.1, E3.2 E3.4, E3.5, E3.6	VII E3-1		Beyond the isolation valves, the RWCU system is generally not safety related and not required to cope with the regulated events, and therefore not in the scope of License Renewal.
VII E3-3	Auxiliary Systems Reactor Water Cleanup System	E3.1.1	VII E3-4, 5		The report does not differentiate between piping $>200^{\circ}$ F and piping $<200^{\circ}$ F. A significant amount of piping in this system operates below 200°F, and therefore is not subject to the scope of GL 88-01.
VII E3-4	Auxiliary Systems Reactor Water Cleanup System	E3.1.1	VII E3-4, 5		GL 88-01 supplement 1 states that RWCU piping downstream of the isolation valves will be exempt from the requirements of this letter following licensee implementation of GL 89-10 requirements on the motor operated isolation valves. Since GL 88-01 does not impose any ongoing requirements on this piping, it is not an appropriate reference for AMP.
VII E3-5	Auxiliary Systems Reactor Water Cleanup System	E3.2.1, E3.2.2	VII E3-6, 7		The RWCU pump is located downstream of the isolation valves. GL 88-01 supplement 1 states that RWCU piping downstream of the isolation valves will be exempt from the requirements of this letter following licensee implementation of GL 89-10 requirements on the motor operated isolation valves. Since GL 88-01 does not impose any ongoing requirements on this portion of the system, it is not an appropriate reference for AMP.
VII E3-6	Auxiliary Systems Reactor Water Cleanup System	E3.2.4	VII E3-6, 7, 8, 9, 10, 11		Since the RWCU pumps are generally not considered safety related, the closure bolting is not subject to the scope of GL 91-17. This pump is not ASME Class 1, and would not be subject the Section XI Subsection IWB inspection requirements.

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CALL SECTION	TITLE	гтем мо	PAGE	REVIEWER	COMMENT
VII E3-7	Auxiliary Systems Reactor Water Cleanup System	E3.3.1, E3.3.2, E3.3.3, E3.3.4	VII E3-10, 11, 12, 13		Quality Group D valves in the RWCU system are not within the scope of the referenced documents and associated AMPs.
VII E3-8	Auxiliary Systems Reactor Water Cleanup System	E3.4.1, E3.4.2	VII E3-12, 13, 14, 15		Above comments apply to RWCU heat exchangers, which are also located downstream of the isolation valves and considered non- safety related.
VII E3-9	Auxiliary Systems Reactor Water Cleanup System	E3.6.1	VII E3-14, 15		The filter demineralizers operate below 200°F, and therefore are not subject to the scope of GL 88-01.
VII E3-10	Auxiliary Systems Reactor Water Cleanup System	E3.6.1	VII E3-14, 15		The filter demineralizers are located downstream of the isolation valves. GL 88-01 supplement 1 states that RWCU piping downstream of the isolation valves will be exempt from the requirements of this letter following licensce implementation of GL 89-10 requirements on the motor operated isolation valves. Since GL 88-01 does not impose any ongoing requirements on this portion of the system, it is not an appropriate reference for AMP.

# E4. Coolant Storage/Refueling Water Cleanup System

- E4.1 Refueling Water Tank (RWT) Heating
  - E4.1.1 Piping and Fittings
- E4.2 RWT Circulation Pump
  - E4.2.1 Bowl/Casing

E4.2.2 Bolting E4.3 Valves BONNET VILEY-B Body E4.3.1 E4.4

- E4.4.1 Bonnet or Cover
- E4.4.2 Tubing
- E4.4.3 Shell
- E4.5 Refueling Water Tank
  - E4.5.1 Shell
  - E4.5.2 Manhole
  - E4.5.3 Penetrations/Nozzles
  - E4.5.4 Tank Heating Coil
  - E4.5.5 Manhole Bolting
  - E4.5.6 Perimeter Seal

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#### E4. Coolant Storage/Refueling Water System

#### System, Structures, and Components

The system, structures, and components included in this table comprise the pressurized water reactor (PWR) coolant storage system and consist of the refueling water tank (RWT) and, if used, the refueling water heating system including circulation pump, heat exchanger, and valves. Based on US Nuclear Regulatory Commission Regulatory Guide 1.26, "Quality Group Classifications and Standards for Water, Steam, and Radioactive-Waste-Containing Components of Nuclear Power Plants," the refueling water tank is classified as Group B Quality Standards and the refueling water heating system as Group C.

Pumps and valves are considered to be active components and pump internals and seats, discs, and other valve items should be covered by the plant maintenance program.

#### System Interfaces

The system that interfaces with the coolant storage/refueling water system is the emergency core cooling system (Table V D1).



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AUXILIARY SYSTEMS COOLANT STORAGE/REFUELING WATER SYSTEM (Pressurized Water System) E4. Further Existing Evaluation Evaluation and Technical Basis Aging Management Program (AMP) (1) Scope of Program: The program includes preventive Yes The applicable AMP relies on material measures to mitigate stress corrosion cracking (SCC) of Elements 4 selection guidelines of Regulatory Guide stainless steel (SS) and inservice inspection (ISI) to and 5 (RG) 1.44 to avoid sensitization of should be monitor the effects of SCC on the intended function of the stainless steels, monitoring and further component. (2) Preventive Actions: Selection of material maintaining water chemistry in in compliance with the requirements of Regulatory Guide evaluated accordance with the guidelines of EPRI (RG) 1.44 prevents or mitigates SCC. Control of halogens TR 102134 and implemented by the and oxygen in the primary water to less than 5 and plant technical specifications, and 0.01 ppm, respectively, during operation, and monitor and inservice inspection is in conformance control of water chemistry during shut down, mitigate with ASME Section XI (edition specified potential of SCC. However, preventive actions are in 10 CFR 50.55a), Table IWD 2500-1, considered inadequate because of inadvertent test and examination category D-B for introduction of contaminants into the coolant system systems in support of emergency core either due to unacceptable levels of contaminants in the cooling, containment heat removal, boric acid, or introduced through the free surface of spent atmosphere cleanup, and reactor fuel pool which can be a natural collector of airborne residual heat removal. contaminants [NRC Information Notice (IN) 84-18]. The DELETE DER VIIE4-1 AMP must therefore rely upon ISI in accordance with ASME Section XI to detect possible degradation. (3) Parameters Monitored/Inspected: The AMP monitors the effects of SCC on intended function of the component by detecting leakage by ISI. Inspection requirements of ASME Section XI Table IWD 2500-1 category D-B specify visual VT-2 (IWA-5240) examination during system leakage test and hydrostatic test of all pressure retaining Class 3 components in support of emergency core cooling. containment heat removal, and reactor residual heat removal. (4) Detection of Aging Effects: Degradation of the component due to SCC cannot occur without leakage of coolant. However, extent and frequency of inspection may be inadequate; inspection of representative components and susceptible locations should be undertaken to provide additional assurance that significant SCC is not occurring. Based on piping/ component geometry and fluid flow conditions, susceptible locations can be identified and evaluated. (5) Monitoring and Trending: System leakage test under Section XI is conducted at =40month intervals. However, this may not be sufficiently frequent to detect the effects of this ARD, and a supplemental inspection program may be needed. (6) Acceptance Criteria: Any relevant conditions that may be detected during the leakage and hydrostatic tests are evaluated in accordance with IWD-3000 for Class 3 components. (7) Corrective Actions: Repair and replacement are in conformance with IWA-4000 and IWB-4000. (8 & 9) Confirmation Process and Administrative Controls: Site QA procedures, review and approval processes, and administrative controls are implemented in accordance with requirements of Appendix B to 10 CFR Part 50 and will continue to be adequate for the period of license renewal. (10) Operating Experience: Although the primary pressure boundary piping of PWRs have generally not been found to be affected by SCC because of low dissolved oxygen levels and control of primary water chemistry, significant potential of SCC exists from inadvertent introduction of contaminants into the primary coolant system (IN 84-18). SCC has been observed in safety injection lines (IN 97-19 and

VII E4-5

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#### E4. COOLANT STORAGE/REFUELING WATER SYSTEM (Pressurized Water System)

	14. COOLANI	STORAGE/REF	UELLING WAT	CR SISIEM (	FICSSMILLEU WI	CCL Cystem)	r	
Item	Structure and Component	Region of Interest	Material	Environ- ment	Aging Effect	Aging Mechanism	References	
						-		2
E4.1.1	Refueling Water Tank (RWT) Heating (if used)	Piping & Fittings	SS	Up to 65°C Chemically Treated Borated Water	Loss of Material	Crevice and Pitting Corrosion	NRC IN 84-18. NRC IN 96-11. Plant Technical Specifications. EPRI TR <del>102194.</del> VII E 44-9	3
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E4. COOLANT STORAGE/REFUELING WATER SYSTEM (Pressurized Water System)

Further Existing Evaluation and Technical Basis Evaluation Aging Management Program (AMP) (continued from previous page) 94-18), charging pump casing cladding [INs 80-38 and 94-63) internal bolting of swing check valves [IN 99-02], an instrument nozzles in affety injection tanks (IN-91-06). (1) Scoppiof Program: The programmetics on preventive The applicable AMP relies measures to mitigate crevice or pitting corrosion and minimizing impurities by monitoring inservice inspection (ISI) to monitor the effects of and maintaining water chemistry in corrosion on the intended function of coolant accordance with the guidelines of EPRI storage/refueling water system components TR 102134 and implemented by the (2) Preventive Actions: Control of halogens and oxygen in plant technical specifications, and the primary water to less than 5 and 0.01 ppm. inservice inspection is in conformance NO respectively, during operation, and monitor and control of with ASME Section XI (edition specified water chemistry during shut down. However, preventive in 10 CFR 50.55a), Table IWD 2500-1, actions are considered inadequate because of inadvertent test and examination category D-B for introduction of contaminants into the coolant system systems in support of emergency core either due to unacceptable levels of contaminants in the cooling, containment heat removal, borie acid, or introduced through the free surface of spent atmosphere cleanup, and reactor pool which can be a natural collector of an born residual heat removal. contaminants [NRC Information Notice (IN) 84-18 1E4-(3) Parameters Monitored/ Inspected: The AMB monitors the effects of corrosion by detection of coolent leakage by inservice inspection (ISI). Inspection requirements of ASME Section XI Table IWD 2500 F category D-B specify visual VT-2 (IWA-5240) examination during system leakage test and system hydrostatic test of all pressure retaining Class 3 components in support of emergency core cooling containment heat removal, and reactor residual beat removal. (4) Detection of Aging Effects: Degretation of the component due to crevice and pitting rosion cannot occur without leakage of coolan SEECK #11) TNSPARI #9 However, extent and frequency of inspection may b inadequate; inspection of representative components and susceptible locations should be undertaken to provide additional assurance that significant creater and pitting corrosion is not occurring. Based on apping/ component geometry and fluid flow conditions, susceptible locations can be identified and evaluated. (5) Monitoring and Trending: System leaking test under Section XI is conducted at =40 month intervals. However, this may not be sufficiently irequent to detect the effects of this ARD, applemental inspection program may be needed. and a ccentance Criteria: Any relevant conditions that may be detected during the leakage and hydrostatic tests are evaluated in accordance with IWD-3000. (7) Correction Actions: Repair and replacement are in conformatice with IWA-4000 and IWB-4000. (8 & 9) Confirmation Process and Administrative Controls: Site OA procedures, review and approval processes, and administrative controls are implemented in accordance with requirements of Appendix B to 10 CFR Bart 50 and will continue to be adequate for the period of license renewal. (10) Operating Experience: Localized corrosion is likely to occur at mechanical joints, e.g., flange connections, because they present a crevice geometry at the sealing surfaces that may allow ouildup of impurities due to stagnant conditions. re potential exists for introduction of

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	E4. 000LAN	1 STORAGE/REF			A	A #1-#		
Item	Structure and Component	Region of Interest	Material	Environ- ment	Effect	Mechanism	References	
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						-	<u>ــــــــــــــــــــــــــــــــــــ</u>	
E4.2.1	RWT Circulation Pump	Bowl/Casing	55	65°C Chemically Treated Borated Water	Loss of Material	Crevice and Pitting Corrosion	ASME Section XI, 1989 Edition. ASME OM Code- 1990, Subsection - ISTB NRC GL 89-04.	2
		-					NRC IN 84-18. NRC IN 94-63. NRC IN 96-11. NRC IN 98-23, Plant Technical	2
							Specifications. EPRI TR <del>102134.</del> 105 71	:4)
							VII 24-4	
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WATER SYSTEM (Pressurized Water System)

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AUXILIARY SYSTEMS VΠ



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	E	4. COOLANT	STORAGE/REF	UELING WATE	CR SYSTEM (	PTESSUITIZED W	ater System)	·	1
Γ	Item	Structure and Component	Region of Interest	Material	Environ- ment	Aging Effect	Aging Mechanism	References	
	54.2.2	RWT Circulation	Bolting	Nuts: CS, Bolts/Studs:	Air. Leaking	Loss of Material	Concortoni Boric Acid	NRC GL 88-05.	S
		Pump		Alloy Steel	Chemically Treated Borated Water	$\left  \right\rangle$	conno.	NRC IN 86-108 S 3.	5
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E	4. COOLANT	STORAGE/REF	UELING WATE	CR SYSTEM (	Pressurized wa	ater System)	r	l
Item	Structure and	Region of	Material	Environ- ment	Aging Effect	Aging Mechanism	References	
item	Component	interest	material	ment				
							ACME Continue	
E4.3.1	Valves	Body and	SS,	Up to 65°C	Loss of Material	Pitting	1989 Edition.	<b>K</b>
	(Check Valves,	Bonnet	Cladding	Treated	material	Corrosion	NRC IN 84-18.	
	Valves, Hand			Borated			NRC IN 94-63.	
	Valves)	1		Water			NRC IN 96-11.	
				1			Plant Technical	
							Specifications.	
		1					EPRI TR 102194.	
		9		1			10571	T
						(	-11	
							VIIE4-9	
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AUXILIARY SYSTEMS VII



VII E4-13

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#### Aging Environ-Aging Region of Structure and References Effect Mechanism ment Component Interest Material Item SME Section XI. Loss of Crevice Chemically Bonnet/ E4.4.1 Heat Bonnet or 1989 Edition: Cover & Tubing: SS, Pitting Treated Material Cover, thru Exchanger NRC IN 84-18. Corros Tubing. Borated 'n (if used) E4.4.3 Shell: CS Water: and EPRI (RWT Heating) Shell Chemically 105714 Treated Heating Water Corrosion/ NRC GL 88-05. Shell: CS. Loss of Air, Shell E4.4.3. Heat ASME Section XI. Material Boric Acid Nuts: CS, Leaking (External Exchanger E4.4.4 1989 Edition. Wastage of Bolts/Studs: Chemically Surface). (if used) External NRC IN 86-108 S3. Treated Bolting Alloy Steel (RWT Heating) Surfaces Borated Water

### E4. COOLANT STORAGE/REFUELING WATER SYSTEM (Pressurized Water System)

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AUXILIARY SYSTEMS COOLANT STORAGE/REFUELING WATER SYSTEM (Pressurized Water System) VII Further F4. Existing Evaluation Evaluation and Technical Basis Aging Management Program (AMP) system as contaminants in the boric acid or int through the free surface of spent fuel peet (IN 84-18), or from ingress of demineralizer rooms (IN 96-11). Corrosion has been observed in solity injection systems, e.g., guide d charging p 98 ings of jS. Market Inservice insection in conformance the effects of corrosion on the intended function of Ry with ASME Section XI (edition specified heat exchanger. (2) Preventive Actions: Monitor in 10 CFR 50.55a), Table IWD 2500-1. control of reactor coolant system and component cooling test and examination category D-B for system water chemistry to minimize impurities, and systems in support of emergency core timely corrective action prevent of mitigate corrosion. However, preventive actions are considered inadequate cooling, and mitigation of corrosion by controlling system water chemistry to because of inadvertent introduction of contaminants into minimize exposure to aggressive the coolant system [NPC Information Notice (IN) 84-18]. VIIE4-9 (3) Parameters Monitored/ Inspected: The program environments. 5 manages the meets of corrosion on the function of the heat exchanger by detection of leakage in the component system. Corrective actions are taken when COO Table limits are exceeded. Inspection requirement of ASME Section XI, Table IWD 2500-1, examination HEMISTRY PROGRAM (JEE CHARATTER #11) category D-B specify visual VT-2 (IWA-5240) examination during system leakage test and system hydrostatic test of all pressure retaining Class 3 components in support of emergency core cooling, containment heat removal, and reactor residual heat removal (4) Detection of Aging Effects: Degradation of the component due to crevice and pitting corrosion minot occur without leakage of coolant. However, extent and frequency of inspection may be inadequate; inspection of representative components and ntible locations drauk be undertaken to provid additional assurance that significant degradation occurring. Based on component geometry and Suid flow conditions, susceptible locations can be then tified and evaluated. (5) Monitoring and Thending: System leakage test under Section XI is conducted at #40-month intervals. However, this may not be sufficiently frequent to detect the effects of the ARD, and a supplemental inspection program met be needed. (6) Acceptance Criteria: Any conditions that may be detected during the relev stage and hydrostatic tests are evaluated in accordance with IWD-3000 for Class 3 components. (7) Correction Actions: Repair and replacement are in conform IWA-4000 and IWB-4000. (8 & 9) Confirmation Process and Administrative Controls: Site Of procedures, review and approval processes, and administrative controls are implemented in accordence with requirements of Appendix B to 10.01 R Part 50 and will continue to be adequate for the period of license renewal. (10) Operating nce: The present AMP has been effective in Exper haging the effects of corrosion in RWT heat exchanger. Same as effect of Corrosion/Boric Acid Wastage of Same as effect of Corrosion/Baric Acid external surfaces of Items E4.2.2 RWT circulation pump Wastage of external surfaces of items E4.2.2 RWT circulation pump bolting. bolting. 56/99 VII EA

VII	AUXILIARY SYS	TEMS I STORAGE/REF	UELING WATI	er system (	Pressurized W	ater System)		)
<u>г</u>	Structure and	Region of		Environ-	Aging	Aging		
Iten	Component	Interest	Material	ment	Effect	Mechanism	References	
F4 5	Refueling	Shell.	6S	Chemically	Loss of	Crevice and	ASME Section XI.	
thru	Water Tank	Manhole.		Treated	Material	Pitting	1989 Edition	
F4 5	RWT	Penetrations/		Borated		Corrosion	NRC IN 84-18.	
124.0.		Nozzles		Water			NRC IN 96-11.	
							Plant Technical	
							Specifications.	
							EPRI TR -102134	4.1
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VII E4-16

VII AUXILIARY SYSTEMS E4. COOLANT STORAGE/REFUELING WAT Existing

Aging Management Program (AMP) The applicable AMP relies on minimizing impurities by monitoring and maintaining water chemistry in accordance with the guidelines of EPRI TR 102134 and implemented by the plant technical specifications, and inservice inspection is in conformance with ASME Section XI (edition specified in 10 CFR 50.55a), Table IWC 2500-1, test and examination category C-H for pressure retaining Class 2 components.

VIIE4-9 PRIMARY WATER HEMISTRY PROGRAM SEE CHAPT.

Evaluation and Technical Basis (1) Scope of Program: The program relies on preventive measures to mitigate crevice or pitting corrosion and inservice inspection (ISI) to monitor the effects of corrosion on the intended function of coolant storage/refueling water system components. (2) Preventive Actions: Control of halogens and oxygen in the primary water to less than 5 and 0.01 ppm, respectively, during operation, and monitor and control of water chemistry during shut down. However, preventive actions are considered inadequate because of inadvertent introduction of contaminants into the coolant system either due to unacceptable levels of contaminants in the boric acid, or introduced through the free surface of spent fuel pool which can be a natural collector of airborne contaminants [NRC Information Notice (IN) 84-18]. (3) Parameters Monitored/ Inspected: The AMP monitors the effects of corrosion by detection of coolant leakage by inservice inspection (ISI). Inspection requirements of ASME Section XI Table IWD 2500-1 category C-H specify visual VT-2 (IWA-5240) examination during system leakage test and system hydrostatic test of all pressure retaining Class 2 components. (4) Detection of Aging Effects: Degradation of the component due to crevice and pitting corrosion cannot occur without leakage of coolant. However, extent and frequency of inspection may be inadequate: inspection of representative components and susceptible locations should be undertaken to provide additional assurance that significant degradation is not occurring. Based on component geometry and fluid flow conditions, susceptible locations can be identified and evaluated. (5) Monitoring and Trending: System leakage test under Section XI is conducted at =40-month intervals. However, this may not be sufficiently frequent to detect the effects of this ARD, and a supplemental inspection program may be needed. (6) Acceptance Criteria: Any relevant conditions that may be detected during the leakage and hydrostatic tests are evaluated in accordance with IWC-3516. (7) Corrective Actions: Repair and replacement are in conformance with IWA-4000 and IWB-4000. (8 & 9) Confirmation Process and Administrative Controls: Site QA procedures, review and approval processes, and administrative controls are implemented in accordance with requirements of Appendix B to 10 CFR Part 50 and will continue to be adequate for the period of license renewal. (10) Operating Experience: Localized corrosion is likely to occur at crevices because of buildup of impurities due to stagnant conditions. The potential exists for introduction of impurities into the coolant system as contaminants in the boric acid or introduced through the free surface of spent fuel pool (IN 84-18), or from ingress of demineralizer resins (IN 96-11).

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AUXILIARY SYSTEMS E4. COOLANT STORAGE/REFUELING WATER SYSTEM (Pressurized Water System)

### Existing

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Aging Management Program (AMP) The applicable AMP relies on material selection guidelines of Regulatory Guide (RG) 1.44 to avoid sensitization of stainless steels, monitoring and maintaining water chemistry in accordance with the guidelines of EPRI TR 102134 and implemented by the plant technical specifications, and inservice inspection is in conformance with ASME Section XI (edition sp ciff in 10 CFR 50.55a), Table IWD 25001, test and examination category C-H or pressure retaining Class 2 components

Evaluation Evaluation and Technical Basis (1) Scope of Program: The program includes preventive Yes measures to mitigate stress corrosion cracking (SCC) of Elements 4 stainless steel (SS) and inservice inspection (ISI) to and 5 monitor the effects of CC on the intended function of the component. (2) inventive Actions: Selection of material should be further evaluated thene requirements of Regulatory Guide in compliance mitigates SCC. Control of halogens (RG e primary water to less than 5 and spectively, during operation, and monitor and er chemistry during shut down, mitigate C. However, preventive actions are adequate because of madvertent fluction of contaminants into the coolant system due to unacceptable levels of contaminants in the acid, or introducer brough the free surface of spent atural collector of airborne fuel pool which an be Information Notice (IN) 84-18]. ts i contat hitored/ Inspected: The AMP monitors ters s of SCC on intended function of the component th by detecting leakage by ISI. Inspection requirements of ASME Section XI Table IWD 2500-1 category C-H specify visual VT-2 (IWA-5240) examination during system leakage test and system hydrostatic test of all pressure retaining Class 2 components. (4) Detection of Aging Effects: Degradation of the component due to SCC cannot occur without leakage of coolant. However, extent and frequency of inspection may be inadequate; inspection of representative components and susceptible locations should be undertaken to provide additional assurance that significant SCC is not occurring. Based on piping/component geometry and fluid flow conditions. susceptible locations can be identified and evaluated. (5) Monitoring and Trending: System leakage test under Section XI is conducted at =40-month intervals. However, this may not be sufficiently frequent to detect the effects of this ARD, and a supplemental inspection program may be needed. (6) Acceptance Criteria: Any relevant conditions that may be detected during the leakage and hydrostatic tests are evaluated in accordance with IWC-3516. (7) Corrective Actions: Repair and replacement are in conformance with IWA-4000 and IWB-4000. (8 & 9) Confirmation Process and Administrative Controls: Site QA procedures, review and approval processes, and administrative controls are implemented in accordance with requirements of Appendix B to 10 CFR Part 50 and will continue to be adequate for the period of license enewal. (10) Operating Experience: Although the primary pressure boundary piping of PWRs have generally not been found to be affected by SCC because of low dissolved oxygen levels and control of primary water chemistry, significant potential of SCC exists from inadvertent introduction of contaminants into the primary coolant system (IN 84-18). SCC has been observed in safety injection lines (IN 97-19 and 84-18). charging pump casing cladding (INs 80-38 and 94-63), internal bolting in swing check valves (IN 89-02), and instrument nozzles in safety

injection tanks (IN 91-05).

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Further

#### VII

	COOLANT	STORAGE/REFU	JELING WATE	r system (	Tessurizeu wa			
Itom	Structure and	Region of Interest	Material	Environ- ment	Aging Effect	Aging Mechanism	References	
E4.5.4	Refueling Water Tank (RWT)	Heating Coll	58	Chemically Treated Borated Water, and Chemically Treated Heating Water	Loss of Material	Crevice and Pitting Corrosion	1989 Edition	VII (711-0
E4.5.5	Refueling Water Tank (RWT)	Manhole Bolting	Nuts: CS, Bolts/Studs: Alloy Steel	Air, Leaking Chemically Treated Borated Water	Loss of Material	Corrosion/ Boric Acid Wastage of External Surfaces	NRC GL 88-05. ASME Section XI 1080 Edition- NRC IN 86-108 S3.	)ETY
E4.5.6	Refueling Water Tank (RWT)	Perimeter Seal	Cold Plastic Coal Tar Pitch Flashing	Air	Loss of elasticity (drying out)	weathering		

AUXILIARY SYSTEMS Jand Water System)

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AUXILIARY SYSTEMS

E4. COULANT STORAGE/REA		Further
Existing	Evaluation and Technical Basis	Evaluation
Plant-specific aging management program.	Plant-specific aging management program is to be evaluated.	Yes no generic AMP
Same as effect of Corrosion/Boric Acid Wastage of external surfaces of Items E4.2.2 RWT circulation pump bolting.	Same as effect of Corrosion/Boric Acid Wastage of external surfaces of Items E4.2.2 RWT circulation pump bolting.	No
Plant-specific aging management program.	Plant-specific aging management program is to be evaluated.	Yes no generic AMP

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CALL SECTION	TITLE	ITEM NO	PAGE	REVIEWER	CLAMMENT
VII E4-1	Coolant Storage/Refueling Water System (PWR)	E4.1.1, and E4.5.3	VII E4-4 through 7, 18 and 19		Delete Stress Corrosion Cracking as an aging mechanism. This system's components are not above 200°F; therefore SCC is not a valid aging mechanism.
VII E4-2	Coolant Storage/Refueling Water System (PWR)	E4.1.1, E4.2.1, E4.3.1, E4.4.1, E4.4.2, E4.4.3, E4.5.1, E4.5.2 & E4.5.3	VII E4-5, 7, 9, 13, 15, 17 and 19		(SCC is not considered to be valid mechanism, see separate comment above. Comments to follow assume that the SCC Aging Mechanism is retained in Report Despite other comment.) In 'Evaluation Technical Basis' for Stress Corrosion Cracking and for Crevice and Pitting Corrosion the program element 4, Detection of Aging Effects, states degradation cannot occur without coolant leakage. This statement is not correct when applied to an environment of chemically treated borated water
VII E4-3	Coolant Storage/Refueling Water System (PWR)	E4.1.1	VII E4-4 and 5		(SCC is not considered to be valid mechanism, see separate comment above. Comments to follow assume that the SCC Aging Mechanism is retained in Report Despite other comment.) SCC is listed as an Aging Mechanism for RWT Heating Piping. Material selection guidelines in accordance with RG 1.44 are not an AMP; they are a design feature and as such should not be listed. ISI/IST is listed in the 'Existing AMP' but the 'Evaluation and Technical Basis' section appears to indicate that ISI/IST (in the guise of VT-2 exams) is not adequate to discover SCC. A supplemental inspection program is indicated instead. Since ISI/IST is not actually to be credited, it should not be listed

CALL SECTION	TITLE	FTEM NO	PAGE	REVIEWER	COMMENT
VII E4-4	Coolant Storage/Refueling Water System	E4.5.3	VII E4-16 and 17		SCC is listed as an Aging Mechanism for the RWT Penetrations/ Nozzles. (SCC is not considered to be valid mechanism, see separate comment above. Comments to follow assume that the SCC Aging Mechanism is retained in Report Despite other comment.) This mechanism was considered Plausible for CCNPP but the root cause appeared to be contaminants not removed during initial fabrication. This is a plant-specific event and this entry may not provide any useful information to other prospective applicants. In addition, material selection guidelines in accordance with RG 1.44 are not an AMP; they are a design feature and as such should not be listed. In addition, the plant chemistry program should not be listed as an AMP in this case because the condition of the process fluid has no bearing on the conditions required for external SCC. Condensation provided the aqueous environment necessary for initiation of SCC, and the level of any impurities in the RWT fluid was not a contributing factor. Also, ISI/IST is listed as in 'Existing AMP' but the 'Evaluation and Technical Basis section' appears to indicate that ISI/IST (in the guise of VT-2 exams) is not adequate to discover SCC. A supplemental inspection program is indicated instead. Since ISI/IST is not actually to be credited, it should not be listed.
VII E4-5	Coolant Storage/Refueling Water System (PWR)	E4.2.2	VII E4-11		In 'Evaluation Technical Basis' for Corrosion / Boric Acid Wastage, program element 4, Detection of Aging Effects, does not state this mechanism requires coolant leakage. The statement 'Degradation of component due to wastage cannot occur without leakage of coolant.' Should be added to program element 4, Detection of Aging Effects.
VII E4-6	Coolant Storage/Refueling Water System (PWR)	E4.2.2 and E4.5.5	VII E4-10, 11, 20 and 21		Corrosion / Boric Acid Wastage should rely on the NRC GL 88-05 program only. (The Boric Acid Corrosion Inspection Program itself was deemed adequate for aging management in the CCNPP SER). Delete reference to ASME activities in all columns. No action should be listed in the ' <b>Further Evaluation</b> ' column. Refer to AMA titled 'Boric Acid Corrosion Program' in lieu of listed AMP.

CALL SECTION	TITLE	ITEM NO	PAGE	REVIEWED	COMMENT
VII E4-7	Coolant	E4.2.2 and	VII E4-10		In some Sections (V.D1, VII.E4) Corrosion/Boric Acid Wastage of
Note 1	Storage/Refueling	E4.5.5	and 20		External Surfaces is an Aging Mechanism, in other Sections
	Water System				(VII.E1) Boric Acid Corrosion is referred to. It seems that these are
	(PWR)				the same Aging Mechanism. The terminology should be consistent
					throughout. Use the terminology "Boric Acid Corrosion". (This
					titled (Paris Asid Comparison Decomputin lies of listed measure
	Coolunt	E421	VILEA 1		This social table of contents should be Dedu and Deput and interview
VII L4-0	Storage/Refueling	194.5.1	VII 124-1		Rody (Page E4-12 lists E4.3.1 as Rody and Bonnet)
	Water System				Douy. (Lage E4-12 lists E4.3.1 as Douy and Donnet.)
	(PWR)				
VII E4-9	Coolant	E4.1.1, E4.2.1,	VII E4-6		Crevice and Pitting Corrosion is controlled by the chemistry control
	Storage/Refueling	E4.3.1, E4.4.1,	through 17,		program alone. The Chemistry Program should comply with EPRI
	Water System	E4.4.2, E4.4.3,	E4-20 and		TR-105714 (not TR-102134). Delete references to ASME
	(PWR)	E4.5.1, E4.5.2,	21	]	inspections in all columns. No action should be listed in the
		E4.5.3 &			'Further Evaluation' column. Refer to AMA titled 'Chemistry
		E4.5.4			Program (Primary)' in lieu of listed program

NOTES: 1. This comment has generic implications regarding other sections of the GALL Report.

# E5. Shutdown Cooling System (Older BWR)

# System, Structures, and Components

The system, structures, and components included in this table comprise the shut-down cooling (SDC) system for the older vintage boiling water reactors (BWRs) and consist of piping and fittings, SDC system pump, heat exchanger, and valves. Based on US Nuclear Regulatory Commission Regulatory Guide 1.26, "Quality Group Classifications and Standards for Water, Steam, and Radioactive-Waste-Containing Components of Nuclear Power Plants," all components in the SDC system are classified as Group B Quality Standards.

Pumps and valves are considered to be active components and pump internals and seats, discs, and other valve items should be covered by the plant maintenance program.

#### System Interfaces

The systems that interface with the SDC system include the reactor coolant pressure boundary (Table IV C1) and closed cycle cooling water system (Table VII C2).

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#### E5. SHUTDOWN COOLING SYSTEM (Old Boiling Water Reactor)

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Item	Structure and	Region of	Material	Environ- ment	Aging Effect	Mechanism	References	
E5 1 1	Pining	Piping and	Carbon Steel	Oxygenated	Loss of	Crevice and	ASME Section XI,	
20.1.1	Fiping	Fittings	ICS),	Water. Up	Material (for	Pitting	1989 Edition.	
			Stainless	to 288°C	CS com-	Corrosion	Plant Technical	
			Steel (SS)		ponents)	-	Specifications.	
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E5.1.1	Piping	Piping and	<del>- 66, -</del>	Uxygenated	Eatimo	raugue	1999 Edition	
V		Fittinge		to 288°C	Damage		ANSI B31.P.	
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DRAF	T - 12/06/99	ALL	VI	I E5-4	E5.1	2		

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TT E5-2 See Chapter XI for on Evaluation of 100000.550/ ASME Section XI (Proclams 1,2 +3, components) and on evaluation AUXILLARY SYSTEMS SHUTDOWN COOLING SYSTEM (Old Boiling Water Reactor) o Primary Water Chenustry Further E5. Evaluation Existing Evaluation and Technical Basis Aging Management Program (AMP) (1) Scope of Program: The program relies on preventive, Yes The applicable AMP relies on Element 4 measures to mitigate crevice or pitting corrosion and minimizing impurities by monitoring should be inservice inspection (ISI) to monitor the effects of and maintaining water chemistry in corrosion on the intended function of shut-down cooling further accordance with the Plant Technical system components. (2) Preventive Actions: Mitigation is evaluated Specifications, and inservice inspection by monitoring and control of water chemistry to in conformance with ASME Section XIminimize concentration of corrosive impurities in (edition specified in 10 CFR 50.55a). accordance with the Plant Technical Specifications. (3) Parameters Monitored/ Inspected: The AMP monitors Table IWC 2500-1, examination category C-H for pressure retaining the effects of corrosion by detection of coolant leakage by Class 2 components. inservice inspection (ISI). Inspection requirements of ASME Section XI specify visual VT-2 (IWA-5240) examination during system leakage test and system hydrostatic test of all pressure retaining Class 2 Primary Water Chemistry components according to Table IWC 2500-1 category C-H. (4) Detection of Aging Effects: Degradation of the 10CFR 50.550/ ASME component due to corrosion is componly accompanied by leakage of coolant. However, the extent of inspection may Section XI, Table not be adequate; inspection of representative components and susceptible locations should be undertaken to provide IWC 2500. additional assurance that significant corrosion is not occurring. Based on piping/component geometry and fluid flow conditions, susceptible ocations can be identified and evaluated. (5) Monitoring and Trending: Inspection schedule of ASME Section XI should provide for timely detection of leakage. System leakage test is conducted at =40-month intervals, and hydrostatic test at or near the end of each inspection interval. (6) Acceptance Criteria: Any relevant conditions that may be detected during the leakage and hydrostatic tests are evaluated in accordance with IWC-3100 and acceptance standards of IWC-3400 and IWB-3516 for Class/2 components. (7) Corrective Actions: Prior to service, corrective measures are needed to meet the requirements of IWB-3142 and IWA-5250. Repair and replacement are in conformance with IWA-4000 and IWB-4000. (8 & 9) Confirmation Process and Administrative Controls: Sife QA procedures, review and approval processes. and administrative controls are implemented in accordance with requirements of Appendix B to 10 CFR Part 50 and will continue to be adequate for the period of license renewal. (10) Operating Experience: Localized corrosion is likely to occur at mechanical joints e.g., flange connections, because they present a crevice geometry at the sealing surfaces that may allow buildup of impucities due to stagnant conditions. No significant corrosion related problem has been reported for piping and fittings in BWR emergency core cooling system. Fatigue is a time-limited aging analysis (ILAA) to be Yee Gomponents have been designed or performed for the period of license renewal, and Generic FLAA evaluated for fatigue for a 40 y design Safety Issue (CSI)-190 is to be addressed. life, according to the requirements of ASME Section III (edition specified in 10 CFR 50.552), Subsection NC, or ANSI B31.1. or other evaluations based on cumulative usage factor (CUF).

#### VII AUXILIARY SISTEMS

1	S. SHUIDOV	The Coolding Sto		Environ	Aging	Aging		
	Structure and	Region OI	Material	ment	Effect	Mechanism	References	
Item	Component	Piping and	SS	Oxygenated	Crack	Stress	NUREG-0313.	
Item E5.1.1	Structure and Component Piping	Region of Interest Piping and Fittings	Material SS	Environ- ment Oxygenated Water, Up to 288°C	Aging Effect Crack Initiation and Growth	Aging Mechanism Stress Corrosion Cracking (SCC)	References NUREG-0313. Rev. 2. NRC GL 88-01. NRC GL 88-01. Sup. 1. ASME Section XI. 1989 Edition. BWRVIP-29. EPRI TR-103515.	
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See Chapter XI For an exaluation of 10CFREDISSA / ASME Section XI/ For Class 1, 2, and 3 components) and an evaluation of the J Primary Water Chambothy Program. AUXILIARY SYSTEMS VII SHUTDOWN COOLING SYSTEM (Old Bolling Water Reastor) £5.′ Further Existing Evaluation Evaluation and Technical Basis Aging Management Program (AMP) (1) Scope of Program: The program is focused on m haging No Program delineated in NUREG-0373. the effects of IGSCC on the intended function of austenitic Rev. 2 and implemented through NRC stainless steel (SS) piping 4 in. or larger in diameter and Generic letter (GL) 88-01 and its contains reactor water at a temperature above 98°C (above Supplement 1, and inservice inspection 200°F) during power operation regardless of Cod in conformance with ASME Section XI classification. It also applies to reactor vessel (edition specified in 10, CFR 50.55a), attachments and appurtenances. NUREG-0313 and GL 88-Table IWC 2500-1, mamination 01, respectively, describe the technical basis and staff category C-F-1 for pressure retaining guidance regarding the problem of IGSCC in BWRs. welds in Class 2 stainless steel piping. 2) Preventive Actions: Mitigation of IGSCC is by selection and testing category C-H for system of material considered resistant to sensitization and leakage. Water chemistry is monitored GSCC, e.g., low-carbon grades of austenitio SSs and weld and maintained in accordance with metal, with a maximum carbon of 0.035% and minimum EPRI gridelines in BWRVIP-29 and TR-7.5% ferrite in weld metal, and by special/processing such 1035/5 to minimize the potential of as solution heat treatment, heat sink welding, and crack initiation and growthinduction heating or mechanical stress improvement (SI). Water chemistry is monitored and maintained in IOCFRED.552/ABME accordance with EPRI guidelines in **B**WRVIP-29 and TR-103515 to minimize the potential of crack initiation and Section ×1, Table 2500-1, growth. Also, hydrogen water chemistry and stringent Categories C-Fand C-H control of conductivity is used to inhibit IGSCC. (3) Parameters Monitored/Inspected: The AMP monitors the effects of IGSCC on the intended function of primary Primary Water coolant system piping by detection and sizing of cracks by inservice inspection (ISI). ASME Section XI Table IWC 2500-1, examination category C-F-1, specifies for Chenustry circumferential and longitudinal welds in each pipe or branch run NPS 4 or larger, volumetric and surface examination of ID region extending 1/4 in. on either side of the weld and 1/3 wall thickness deep, and surface examination of OD surface extending 1/2 in. on either side. Surface examination is conducted for circumferential and fongitudinal welds in each pipe or branch run less than NPS 4. For socket welds, surface examination is specified of OD surface extending 1 in. on the buttered side and 1/2 in. on the other. Requirements VI. for training and qualification of personnel and E5 performance demonstration for procedures and equipment is in conformance with Appendices VII and VIII of ASME Section XI, or any other formal program approved by the NRC. Inspection requirements of testing category C-H specify visual VT-2 (IWA-5240) examination of all pressure retaining Class 2 components during system leal/age test (IWB-5221) and system hydrostatic test (IWB-5222). Leakage detection is in conformance with Position \$\vec{q}\$ of Regulatory Guide 1.45. (4) Detection of Aging Effects Aging degradation of the piping can not occur without crack initiation; extent and schedule of inspection assure detection of cracks before the loss of intended function of austenitic SS piping and fittings. (5) Monitoring and Trending: Inspection schedule of ASME Section XI provides for timely detection of cracks. Inspection schedule and sample size specified in Table 1 of G\$ 88-01 are based on the condition of each weld and are quate for timely detection of cracks. Welds of

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B	Structure and	Region of		Environ-	Aging	Aging	
Item	Component	Interest	Material	ment	Effect	Mechanism	References
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#### AUXILIARY SYSTEMS SHUTDOWN COOLING SYSTEM (Old Boiling Water Reactor) VII

E5. SHUTDOWN COOLING SYS	TEM (Old Bolling water Reactor)	Further
Existing	nuturation and Technical Basis	Evaluation
ES. SHUTDOWN COOLING SYS Existing Aging Management Program (AMP)	<b>TEM (Old Bolling Water Reactor)</b> Evaluation and Technical Basis (continued from previous page) resistant material are as a minimum examined according to an extent and frequency comparable to those of ASME Section XI, e.g., 25% are examined every 10 y, at least 12% in 6 y. Inspection extent and schedule are enhaned for welds of non-resistant materials, or welds that have been treated by SI or reinforced by weld overlay. (6) Acceptance <b>Criteria:</b> Any IGSCC degradation is evaluated in accordance with IWB-3100 by comparing ISI results with the acceptance standards of IWC-3400 and IWC-3514. Planar and liner flaws are sized according to IWA-3300 and IWA-3400. (7) Corrective Actions: Repair and reexaminations are in conformance with IWA-4000. Continued operation without repair requires that crack growth calculation be performed according to the guidance of GL 88-01 or other approved procedures. Repair methods include weld overlay reinforcement or partial replacement. Approved clashping devices may be used for temporary reinforcement of cracked weldments. SI is considered effective mitigation for short and shallow cracks. e.g., not longer than 10% of circumference and not deeper than 30% of wall thickness. (8 & 9) Confirmation <b>Process and Administrative Controls:</b> Sit QA procedures, review and approval processes, and administrative controls are implemented in accordance with requirements of Appendix B to 10 CFR Part 50 and will continue to be adequate for the period of license renewal. (10) Operating Experience: IOSCC has occurred in small- and large-diarteter BWR piping made of austenitic SSs. Significant cracking has occurred in RHR system and reactor water cleanup system piping welds. The AMP outlined in NUREG-0313 and GL 88-01 is based on substantial effort in research and development, and industry/recommendations developed in response to NRC communications. The program addresses improvements in the mree elements that cause IGSCC. e.g., a susceptible (sensfized) material, si	Further Evaluation

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1	5. SHUTDOW	IN COOLING SYS	TEM (Old BO	ung water K	A dind	Aging	
	Structure and	Region of	Material	Environ-	Effect	Mechanism	References
Item	Component	Interest	Material	Ai-	Attrition	Wear	NUREG-1339.
Item E5.1.2	Component Piping	Bolting	Jow-Alloy Steel	Air. Metal Tempera- tures up to 288°C	Attrition	Wear -	NUREG-1339. EPRI NP-5769. NRC GL 91-17. IEB 82-02. NRC Bull 89-02. NRC IN 90-68 S1. ASME Section XI. 1989 Edition.

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See Chapter XI for on evaluation of 10CFR 50.553/ASME Section XI (for Class 1, Z, ond 3 components),

	VII	AUXILIARY SYSTEMS	man	$\sim$	$\smile$
		E5. SHUTDOWN COOLING SYS	TEM (Old Boiling Water Reactor)	Further	I
1	~	Existing	- I II mah ing Pasis	Evaluation	
	Aze	ng Management Program (AMP)	Evaluation and Technical Dasis	No	
1	Beron	mendations for a compreheneive	(1) Scope of Program: The stati guidance of White Contains		
/	boltin	g integrity program delineated in	Letter (GL) 91-17 provides assurances that plain specific		1
	NURE	G-1339 on resolution of Generic	comprehensive bolting integrity programs have been		
	Safety	Issue 29 and implemented	implemented to ensure bolting reliability. The wife start		!
	throu	gh NRC Generic Letter 91-17:	recommendations and guidelines for a comprehensive		
	additi	onal details on bolting integrity	bolting integrity program is defineated in Nordos 1000.		
	outlin	ed in EPRI NP-5769; and inservice	and the industry's technical basis for the program to		
1	inspe	ction in conformance with ASME	outlined in EPRI NP-5769. (2) Frebenitive returns		
1	Sectio	on XI (edition specified in 10 CFR	Selection of boiling material and the use of EPRI NP-5769		
1	50.55	a), Table IWC 2500-1, examination	sealants in accordance will guidelines of 23.9 prevent or		
	categ	ories C-D for pressure retaining	and additional requirements of Noracly safety-related		
	boltin	g in Class 2 components, and	mitigate degradation and failure of the order to a stress		1
	teetin	g category C-H for system leakage.	closure bolung. The use of A 200 00 for quere and de		1
	1		The second secon		1
	1	1 1	S and 17-4PH bolting is limited to Rockwell Re26 (Bull		1
	1	COST.552/ADME	00 00) (2) Parameter Monitored / Inspected: The AMP	1	1
	1 100	Thousand The	05-02). (3) Fur unterer monitor degradation on the intended		1
	50	ctionx1, labe + ~ //	function of closure bolting by/detection of coolant leakage,		1.
	10	In conde /	and by detection and sizing of cracks by inservice		
	1 (a	Hegories C-V-V-	inspection (ISI). Inspection requirements of ASME	ļ	
	10	ч <sup>-</sup> /	Section XI Table IWC 2500-1, examination category C-D		
		$\sim$	for pressure retaining bolking greater than 2 in. in		
			diameter specify volumetric examination of the entire		
-	+	$\sim$ /	length of bolts. However, because most failures have		1
	1		occurred in fasteners 2 in. or smaller, based on IE Bulletin		
			82-02, enhanced inspection and improved techniques are		
			recommended. These examinations may be conducted on	1	
			one component among a group of components with		
			similar design and performing similar functions in the		
	1		system. Requirements for training and qualification of		
	i		personnel and performance demonstration for procedures		
			and equipment is in conformance with Appendices vir and	<b>`</b>	
			VIII of ASME Section XI, and additional requirements of		
			EPRI NP-5769. Requirements of Table Iwe 2500-1		1
			category C-M specify visual V1-2 (IWA-5246) examination		
			during system leakage test and hydrostate test of an		
			pressure retaining class 2 components: (c) bolting can not		
			Aging Effects. Degradation of also, loss of prestress or		
			occur we not the closure bolting would result in leakage.		
			The evient and schedule of inspection assure detection of	1	
			aging hegradation before the loss of intended function of		
			closure bolting. (5) Monitoring and Trending: Inspection		
			scheliule of ASME Section XI are effective and adequate fo	r	
	ł		timely detection of cracks and leakage. System leakage		
			test is conducted prior to plant startup following each		
			refueling outage, and hydrostatic test is conducted at or		
			near the end of each inspection interval. (6) Acceptance		
			Criteria: Any cracks in closure bolting are evaluated in		
			accordance with IWC-3100 by comparing ISI results with		
	1		the acceptance standards of IWC-3400 and IWC-3513 and		
	1		3517. Any relevant conditions that may be detected during	5	1
			the leakage and hydrostatic tests are compared with Inte-		┙┙
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		and the system (old Boiling Water	Reactory
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F	5. SHUTDOW	N COOLING SIS	The Concession	Equiron 1	Adind	Aging	
	Structure and	Region of	Material	Environ-	Effect	Mechanism	References
liem	Component	Interest	Material	ment	Direct		
						-	
E5.2.1	Pump	Bowl/Casing	cs	Oxygenated Water, Up to 288°C	Loss of Material	Crevice and Pitting Corrosion	ASME Section XI. 1989 Edition. ASME OM Code-
							ISTB. NRC GL 89-04. Plant Technical Specifications.

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E5. SHUTDOWN COOLING SYS	TEM (Old Boiling Water Reactor)	
Existing Aging Management Program (AMP)	Evaluation and Technical Basis	Further Evaluation
Aging Management (10gram (211))	fcontinued from previous bage!	
	acceptance standards of IWC-3516. (7) Corrective Actions:	
	Repair and replacement is in conformance with IWA-4000	
	and guidelines and recommendations of EPRI XP-5769. (8	
	8, 9) Confirmation Process and Administrative Controls:	
	Site OA procedures, review and approval processes, and	
	administrative controls are implemented in accordance	
	with requirements of Appendix Bao 10 CFR Part 50 and	
	will continue to be adequate for the period of license	
	renewal. (10) Operating Experience: Significant number of	
	incidents have been reported on bolts and nuts that have	
	failed or become degraded because of SCC. Examples of	
	affected fasteners include (a) steam generator and	
	pressurizer manway closures, (b) valve bonnets and pump	
	flange connections on lines 6 in. or greater, and (c) control	1
	rod drive and pressurizer heater connections. The bolting	
	integrity programs developed in accordance with	
	commitments made in response to NRC communications	
	on bolting events have provided effective means of	
$  \land \rangle$	enouring bolting reliability.	
	(1) Soons of Drogram The program relies on preventive 7	Yes,
The applicable AMP is based on	measures to mitigate crevice or nitting corrosion and	Element 2
guidelines given in the Plant Technical	combination of inservice inspection (ISI) and inservice	should be
Specifications and relies on	testing (IST) to monitor the effects of corrosion on the	further
minimizing impurities by monitoring	Nintended function of shut-down cooling system	evaluated.
Land maintaining water chemistry	components. (2) Preventive Actions: Mitigation is by	1
conditions. Inservice inspection is in	monitoring and control of water chemistry to minimize	
(conformance with ASME Section A	concentration of corrosive impurities in accordance with	
Altable BUC 2500.1 exemination	the Plant Technical Specifications. (3) Parameters	
Table Two 2500-1, examination	Monitored / Inspected: The AMP monitors the effects of	
Clease 2 components: and based on the	corrosion by ISI to detect coolant leakage and IST to	
tracting requirements of 10 CFR 50 55a	evaluate component performance. Inspection	
testing requirements of To Crit bolood	requirements of ASME Section XI specify visual VT-2	
additional NEC staff guidelines of NEC	(TWA-5240) examination during system leakage test and	
Constant of the BQ-04 inservice testing	hydrostatic test of all pressure retaining Class 2	
Generic Editer 83-04, inscriber tooling	components according to Table IWC 2500-1 category C-H.	
Subsection TWP (or Operation and	Based on the requirements of 10 CFR 50.55a for ASME	
Maintenance Code Subsection ISTB) for	Code Class 2 pumps and additional guidelines of NRC	
maintenance code bubbeccuon rore, in	Generic Letter (GL) 89/04, IST is performed in accordance	
the plant-monifications	with ASME Subsection IWP (or OM Code Subsection ISTB).	
Put print Spectrume.	(4) Detection of Aging Effects: Degradation of the	
INFEREN.552/ABME	component due to corrosion would result in leakage of	
I'M NOUTE THIS OCH	coolant or degradation of component performance; extent	
Section X) Table LULCON.	and schedule of ISI/IST assure detection of corrosion	
	before the loss of intended function of the component.	
10	(5) Monitoring and Trending: ISI/IST schedule of ASME	1
Primary Waser /	Section XI should provide for timely detection of	1
hole tome	corrosion. System leakage test is conducted prior to plant	
1 Vromising	startup following each refueling outage, and hydrostatic	
	test/at or near the end of each inspection interval.	
	(6) Acceptance Criteria: Any relevant conditions that may	
	be detected during the leakage and hydrostatic tests are	
	Ivaluated in accordance with IWC-3100 and acceptance	
	standards of IWC-3400 and IWB-3516 for Class 2	
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	Chapter & I for an evaluation of	Increase,
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	Lan Carlin XIIIN UCOS and	
AU I A		
ALL KAT AS	MO Scalustin & Primary Wal	er Chimu
TES-2 ST AS	nd an evaluation of Primary Wat	er Chimu
TES-2 SCAS	nd an evaluation of Primary Wat VII E5-13 DRAFT-	er Chimu 12/06/99

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## AUXILIARY SYSTEMS E5. SHUTDOWN COOLING SYSTEM (Old Boiling Water Reactor)

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Item	Structure and Component	Region of Interest	Material	Environ- ment	Aging Effect	Aging Mechanism	References
		-				-	
E5.2.2	Ритр	Bolting	Low-Alloy Steel	Air, Leaking Oxygenated Water	Attrition	Wear	NUREG-1339. EPRI NP-5769. NRC GL 91-17. IEB 82-02. NRC Bull 89-02. NRC IN 90-68 S1. ASME Section XI. 1989 Edition.
E5.3.1	Valves (Check, Control, Hand, Motor Operated, & Relief Valves)	Body and Bonnet	CS Forging. CS Casting, SS Forging. SS Casting	Oxygenated Water, Up to 288°C	Loss of Material	Crevice and Pitting Corrosion	ASME Section XI, 1989 Edition. NRC IN 98-24, Plant Technical Specifications.

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AUXILIARY SYSTEMS E5. SHUTDOWN COOLING SYSTEM (Old Boiling Water Reactor)

		Econthese
Existing	The location and Technical Basia	Further
Aging Management Program (AMP)	Evaluation and recrinical basis	Evaluation
	(continued from previous page)	
	components. (7) Corrective Actions: Prior to service	
	corrective measures are needed to meet the requirements	
	of IWB-3142 and IWA-5250. Repair and replacement are in	
	conformance with IWA-4000 and IWA-7000. (8 & 9)	
	Confirmation Process and Administrative Controls: Site	
	QA procedures, review and approval processes, and	
	administrative controls are implemented in accordance	
	with requirements of Appendix B to 10 CFR Part 50 and	
	will continue to be adequate for the period of license	
	renewal. (10) Operating Experience: Localized corrosion is	
-	likely to occur at flange connections and other crevices	
	where buildup of impurities can occur. No significant	
	corrosion related problem has been reported for pumps in	
	BWR shut-down cooline system.	
Come as for Wass of Itam PE 1 2 holding	Same as for Wear of Item E5.1.2 bolting for piping flange	No
Some as for wear of term \$3.1.2 boung	connections	
for pipting junge contrections.	Contractional	
$\frown$		
$\left( \right) $		
The emplicable AMP based on	(1) Second of Program: The provision relies on preventive	Yes.
fuidalings styen in the Plant Technical	measures to mitigate crevice or nitting corrosion and	Element 4
guidennes given in the riant rechnical	inservice inspection (ISD to monitor the effects of	should be
specifications and refles on	corrosion on the intended function of shut-down cooling	further
and maintaining mater abamiatar	system components (2) Preventive Actions: Mitibation is	evaluated
and maintaining water chemistry	by monitoring and control of water chemistry to	1
conditions. Inscruce inspection is in	minimize concentration of corrosive impurities by	NO
(adition specified in 10 OFP 50 555)	following guidelines of the Plant Technical	N-
Table RKC 2500 1 eveningtion	Specifications (3) Parameters Monitored / Inspected: The	
Table DWC 2500-1, examination	AMP monitors the effects of corrosion by ISI to detect	
category U-H for pressure retaining	nor moments are enects of contraining for to acteer	
CI2SS Z COMPONENTS:	could is canage and is i to evaluate component	
	VI and the view of VIT 0 (WVA 50.40) evamination during	
$\gamma$ $(1, 1)$	Al Specify Visual VI-2 (IVA-5240) examination during	
Kriman Water	system leakage test and hydrostatic test of all pressure	
	RECAILING CLASS 2 componences according to rable five	
(nemistry	2000/1 Category C-II. (4) Detection of Aging Effects:	
- /	Degradation of the component due to correston would	
	result in leakage of coolant. However, extent of inspection	
1	may not be adequate; inspection of representative valves	
INDESD.552/ASME	and susceptible locations should be undertaken to provide	
I'm The second	additional assurance that significant corrosion is not	
Soction XI, Jable BNL-2000	occurring. This inspection can be visual if the valve is	
1	disassembled, and may be covered by the plant	
	maintenance program. Ut thickness measurements could	
	a second second second second manual for a second	
	also be used. (5) Monitoring and Trending: ISI schedule of	
	also be used. (5) Monitoring and Trending: ISI schedule of ASME Section XI should provide for timely detection of	
	also be used. (5) Monitoring and Trending: ISI schedule of ASME Section XI should provide for timely detection of corrosion. System leakage test is conducted prior to plant	
	also be used. (5) Monitoring and Trending: ISI schedule of ASME Section XI should provide for timely detection of corrosion. System leakage test is conducted prior to plant starup following each refueling outage, and hydrostatic	
	also be used. (5) Monitoring and Trending: ISI schedule of ASME Section XI should provide for timely detection of corrosion. System leakage test is conducted prior to plant startup following each refueling outage, and hydrostatic test at or near the end of each inspection interval.	
THE 2	also be used. (5) Monitoring and Trending: ISI schedule of ASME Section XI should provide for timely detection of corrosion. System leakage test is conducted prior to plant startup following each refueling outage, and hydrostatic test at or near the end of each inspection interval. (6) Acceptance Criteria: Any relevant conditions that may	
THE -2 7	also be used. (5) Monitoring and Trending: ISI schedule of ASME Section XI should provide for timely detection of corrosion. System leakage test is conducted prior to plant startup following each refueling outage, and hydrostatic test at or near the end of each inspection interval. (6) Acceptance Criteria: Any relevant conditions that may be detected during the leakage and hydrostatic tests are	
VII -2 7 E5-2	also be used. (5) Monitoring and Trending: ISI schedule of ASME Section XI should provide for timely detection of corrosion. System leakage test is conducted prior to plant startup following each refueling outage, and hydrostatic test at or near the end of each inspection interval. (6) Acceptance Criteria: Any relevant conditions that may be detected during the leakage and hydrostatic tests are	A
VII -2 7 E5-2 7	also be used. (5) Monitoring and Trending: ISI schedule of ASME Section XI should provide for timely detection of corrosion. System leakage test is conducted prior to plant starup following each refueling outage, and hydrostatic test at or near the end of each inspection interval. (6) Acceptance Criteria: Any relevant conditions that may be detected during the leakage and hydrostatic tests are Chapter XI for an excallation of	
VII -27 E5-2 Sec	also be used. (5) Monitoring and Trending: ISI schedule of ASME Section XI should provide for timely detection of corrosion. System leakage test is conducted prior to plant starup following each refueling outage, and hydrostatic test at or near the end of each inspection interval. (6) Acceptance Criteria: Any relevant conditions that may be detected during the leakage and hydrostatic tests are Chapter XI for an exaluation of	F es 17 J
TULL -27 E5-2 JACO	also be used. (5) Monitoring and Trending: ISI schedule of ASME Section XI should provide for timely detection of corrogion. System leakage test is conducted prior to plant starup following each refueling outage, and hydrostatic test at or near the end of each inspection interval. (6) Acceptance Criteria: Any relevant conditions that may be detected during the leakage and hydrostatic tests are Chapter XI for an exaluation of the Disso I ASME Section XI (for Cla	7 85 1, 2, 2
VIII -2 E5-2 Joce	also be used. (5) Monitoring and Trending: ISI schedule of ASME Section XI should provide for timely detection of corrogion. System leakage test is conducted prior to plant starup following each refueling outage, and hydrostatic test at or near the end of each inspection interval. (6) Acceptance Criteria: Any relevant conditions that may be detected during the leakage and hydrostatic tests are Chapter XI for an evaluation of content of the section XI (for Cla and the section XI (for Cla	7 851, 2, 2,
VIII-2-2 E5-2 Joce Comp	also be used. (5) Monitoring and Trending: ISI schedule of ASME Section XI should provide for timely detection of corrogion. System leakage test is conducted prior to plant starup following each refueling outage, and hydrostatic test at or near the end of each inspection interval. (6) Acceptance Criteria: Any relevant conditions that may be detected during the leakage and hydrostatic tests are Chapter XI for an evaluation of a SD, 552 / ASME Section XI (for Cla on ents) and an evaluation of frima	7 851, Z, 2 y Wate
VIII-2-2 E5-2 Joce Comp	also be used. (5) Monitoring and Trending: ISI schedule of ASME Section XI should provide for timely detection of corrogion. System leakage test is conducted prior to plant starup following each refueling outage, and hydrostatic test at or near the end of each inspection interval. (6) Acceptance Criteria: Any relevant conditions that may be detected during the leakage and hydrostatic tests are Chapter XI for an evaluation of a SD, 552 / ASME Section XI (for Cla on ents) and an evaluation of prima	7 851, 2, 2 7 Wate
VIII-2-2 E5-2 Joce Comp Chem	also be used. (5) Monitoring and Trending: ISI schedule of ASME Section XI should provide for timely detection of corrogion. System leakage test is conducted prior to plant starup following each refueling outage, and hydrostatic test at or near the end of each inspection interval. (6) Acceptance Criteria: Any relevant conditions that may be detected during the leakage and hydrostatic tests are Chapter XI for an evaluation of a SD, 552 / ASME Section XI (for Cla on ents) and an evaluation of prima ustry	7 851, Z, 2 7 Wate 12/06/99

## E5. SHUTDOWN COOLING SYSTEM (Old Boiling Water Reactor)

	Structure and	Region of		Environ-	Aging	Aging	
Ite	m Component	Interest	Material	ment	Effect	Mechanism	References
			-			-	
E5.3.	1 Valves (Check, Control, Hand, Motor Operated, & Relief Valves)	Body and Bonnet	SS Forging. SS Casting	Oxygenated Water, Up to 288°C	Crack Initiation and Growth	SCC	ASME Section XI, 1989 Edition. NUREG-0313. Rev. 2. NRC GL 88-01. NRC GL 89-04. NRC GL 96-05. NRC IN 88-70. BWRVIP-29. EPRI TR-103515.

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E5. SHUTDOWN COOLING SYSTEM (Old Boiling Water Reactor)

1	Existing		Further
	Aging Management Program (AMP)	Evaluation and Technical Basis	Evaluation
		(sontinued from previous page)	
		evaluated in accordance with IWC-3100 and acceptance	
		standards of IWC-3400 and IWC-3516 for Class 2	
		components. (7) Corrective Actions: Prior to service,	
		corrective measures are needed to meet the requirements	
		of IWB-3142 and IWA-5250. Repair and replacement are in	
1	· ·	conformance with IWA-4900. (8 & 9) Confirmation	
		Process and Administrative Controls: Site QA procedures.	
		review and approval processes, and administrative	
		controls are implemented in accordance with	
	-	requirements of Appendix B to To CrACart So and will continue to be adequate for the period of license renewal	
		(10) Operating Experience: Localized corresten is likely to	
		occur at crevice geometry where buildup of impurities can	
		occur. Failure of steam turbine governor valves due to	
		corrosion scale buildup has occurred in RCIC and AFW	
/		systems (NRC IN 98-24).	
	Guidelines of NURPO-0913 Rev. 2 and	(1) Scope of Program: The program includes preventive	No
	NBC Generic letter (GL) 88-01 and its	measures to mitigate stress corrosion cracking (SCC) of	
	Supplement 1: and based on plant	stainless steel (SS) and inservice inspection (ISI) to	
	technical specifications, inservice	monitor the effects of SCC on intended function of the	
	inspection in conformance with ASME	valves. NUREG-0313 and GL 88-01, respectively, describe	
- /	Section XI (edition specified in 10 CFR	the technical basis and staff guidance regarding the	
	50.55a), Table IWC 2500-1, examination	problem of IGSCC in BWRs. (2) Preventive Actions:	
/	category C-G for pressure retaining	Mitigation of IGSCC is by selection of material considered	
/	welds in Class 2 valves and testing	resistant to sensitization and IGSCC, e.g., low-carbon	
	category C-H/for system leakage. Water	grades of cast SSs and weid metal, with a maximum	
	chemistry is monitored and maintained	carbon of 0.035% and minimum 7.5% leffile. Water	
	in accordance with EPRI guidelines in	chemistry is monitored and mantained in accordance	
	BWRVIP-29 and TR-103515 to minimize	minimize the potential of crack initiation and growth.	
	the potential of crack initiation and	Also, bydrogen water chemistry and stringent control of	
	grown:	conductivity is used to inhibit IGSCC. (3) Parameters	
	1	Monitored/Inspected: The AMP monitors the effects of	
	IDCFESD, SSA/ASME	SCC on intended function of the valves by detection and	
	C line chomics	sizing of cracks by ISI./Inspection requirements of Table	
	Dechorcel Categories	IWC 2500-1 for Class 2 valves, category C-G specifies for all	
	C-Gana GH.	valves in each piping run examined under category C-F-1.	
		surface examination of either the inside or outside surface	
	Permanen (Mater /	of all welds extending 1/2 in. on either side of the weld. In	
		a group of multiple valves of similar design, size, function,	
	Chemistry /	and service in a system, examination of only one valve is	
	· /	values due to SCC can not occur without crack initiation	
		or degradation of nump performance: ISI schedule assures	
	$\land$	detection of cracks or degradation of valve performance	
		before the loss of intended function of the valves.	
	1	(5) Monitoring and Trending: Inspection schedule in	
		accordance with IWC-2400 should provide timely	
		detection of cracks. All welds are inspected each	
		inspection period from at least one valve in each group	
		with similar design and performing similar functions in	
		the system. Visual examination is required only when the	
		valve is disassembled for maintenance, repail, of	
·		volumente chammanon, our at hast price uning the	
		al la T for an evaluation of	
	/ See	Chapter of the contraction of	md ?
	V Inca	9.55a ASME Section XI (torclass 1, 2, 0	i lour
		month) and an evaluation of Primary	Water/
	contraction (comp		$\sim$
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#### E5. SHUTDOWN COOLING SYSTEM (Old Boiling Water Reactor)

Item	Structure and Component	Region of Interest	Material	Environ- ment	Aging Effect	Aging Mechanism	References
E5.3.2	Valves (Check, Control, Hand, Motor Operated, & Relief Valves)	Bolting	Low-Alloy Steel	Air, Metal Tempera- tures up to 288°C	Attrition	Wear	NUREG-1339. EPRI NP-5769. NRC GL 91-17. IEB 82-02. NRC Bull 89-02. NRC IN 90-68 S1. ASME Section XI, 1989 Edition.
E5.4.1 thru E5.4.4	Heat Exchanger	Tubes, Tubesheet, Channel & Head, Shell	Tubes: SS; Tubesheet: CS (SS Cladding on Channel Side); Channel & Head: CS; Shell: CS	Oxygenated Water; and Treated Component Cooling Water	Loss of Material	Crevice and Pitting Corrosion	ASME Section XI, 1989 Edition. Plant Technical Specifications.

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AUXILIARY SYSTEMS VII SHUTDOWN COOLING SYSTEM (Old Boiling Water Reactor) E5. Further Existing Evaluation Evaluation and Technical Basis Aging Management Program (AMP) (continued from previous page) period. (6) Acceptance Criteria: Any SCC degradation is evaluated in accordance with IWC-3100 by comparing ISI results with the acceptance standards of IWC-3400 and IWC-3515. (7) Corrective Actions: Repair and replacement are in conformance with IWA-4000. (8 & 9) Confirmation Process and Administrative Controls: Site QA procedures. review and approval processes, and administrative controls are implemented in accordance with requirements of Appendix B to 10 CFR Part 50 and will continue to be adequate for the period of license renewal. (10) Operating Experience: The comprehensive AMP outlined in NUREG-0313 and GL 88-01 addresses improvements in all three elements that cause SCC, e.g., a susceptible material, significant tensile stress, and an aggressive environment, and has provided effective means of ensuring etructural integrity of BWR components Same as for Wear of Item E5.1.2 bolting for piping flange Same as for Wear of Item E5.1.2 bolting zonnections. onnections. See Chapter XI for on evaluation of ASME Section XI, for piping flange connections. IOCFESO, SSa/ASME Fable ILC. Section XI, Table IWC, Categories C-Dand C-M (1) Scope of Program: The program is focused on managing No Detection of reactor coolant leakage the effects of corrosion on the intended function of heat radiation and temperature monitors i exchangers and coolers in shut-down cooling system. component cooling system. inservice (2) Preventive Actions: Monitor and control of reactor inspection in conformance with ASME coplant system and component cooling system water Section XI (edition specified in 10 CFR chemistry to minimize impurities, and timely corrective 50.55a), Table IWC 2500-1, examination action prevent or mitigate corrosion in accordance with category C-H for pressure retaining Plant Technical Specifications. The parameters Class 2 components, and mitigation of monitored include halogens, sulfates, oxygen, and pH in corrosion by controlling system water the primary water, and in addition to these, dissolved chemistry to minimize exposure to copper and iron, and suspended solids in the component aggressive environments in accordance cooling water. (3) Parameters/Monitored/ Inspected: The with Plant Technical Specifications program manages the effects of corrosion on the function of the heat exchangers by monitoring parameters directly Himmy Water related to corrosion, e.g., dissolved iron and copper, and by detection of leakage by radiation and temperature monitors, in the component cooling system. Corrective actions are taken when acceptable limits are exceeded. Also, inspection requirements of ASME Section XI specify visual VT-2 (IVA-5240) examination during system leakage test/and hydrostatic test of all pressure retaining Class 2 components according to Table IWC 2500-1 category C-H. (4) Detection of Aging Effects: Monitoring of dissolved iron and copper, suspended solids, radiation, and temperature would detect the existence of corrosion; frequent monitoring assure timely detection of the effects of corrosion before loss of intended function of heat

See Chapter tot for an evaluation of 10 CFE D. 552 / ASME Section XI (for Classi, 2, 13 Components).

VII E5-19

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	Structure and	Region of		Environ-	Aging	Adind	1
Item	Component	Interect	Motorial			1. <u>1</u> 56	
L	Component	merest	Material	ment	Ellect	mechanism	References
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£5.4.5	Heat	Bolting	Low-Alloy	Air,	Attrition	Wear	NUREG-1339.
] 1	Exchangers	-	Steel	Metal	[ ]		FPPI NP.5760
1				Tomore		1	
				1 empera-		1	NRC GL 91-17.
1 ·				tures up to		1	IEB 82-02.
				2880	1 1		NTPC Bull 80.00
				~~~~			NAC DUI 09-02.
							NRC IN 90-68 S1.
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### E5. SHUTDOWN COOLING SYSTEM (Old Boiling Water Reactor)

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TT.	SWITTOOWN COOLING SYSTEM (Old Boiling Water Reactor)	
F.D.	SHITTED WIN COULING SISTEM (OIL DOLLE WALCE REACTOR)	

Fristing			Further
Aging Management Program (AMP)	Evaluation and Technical Basis		Evaluation
Aging management riegium (am)	trantinued from previous page		
	exchangers (5) Monitoring and Trending: Frequ	ient	
	monitoring of component cooling system and AS	SME /	
	Section XI testing schedule should provide for th	mel	
	detection of leakage or effects of corrosion Base	don plant	
	apacifies water chemistry monitoring may range	from few	
	specifics, water chemistry monthering may range	st is	
	times a week to once a month. System leanage to	refueling	
	conducted prior to plant startup following cach	each	
	outage, and hydrostatic test at of hear the end of	v relevant	
	inspection interval. (o) Acceptance Criteria Al	mary	
-	conditions related to corresion of leakage of pri	limite	
	coolant are compared to established acceptable	in in	
	Results of Section AI leakage lests are evaluated	larde of	
	accordance with IwC-5100 and acceptance stand	Root	
	IWC-3400 and IWB-3516. ("Corrective Actions.	on when	
	cause evaluation and appropriate corrective acu	tod	
	acceptable limits are exceeded or leakage is deled	h TITA	
	Repair and replacement are in conformance with	ctrative	
	4000. (8 & 9) confirmation Process and Autout	structure int	
	Controls: Site GA procedures, review and approv	all	
	processes, and administrative controls are hip		
	in accordance with requirements of Appendix B t		
	Part 50 and will continue to be adequate for the	period of	
	license renewal. (10) Operating Experience: Ope	raung	
	plant experience with this AMP indicate timely	detection	
	of corresion in the shut-down cooling system he	at	
	exchangers by monitoring for temperature, eleva	ated	
	radiation levels, and corrosion products in the c	component	
	cooling system.		
Same as for Wear of Item E5.1.2 bolting	Same as for Wear of Item E5.1.2 bolting for pipin	ig flange	No
for piping flange connections.	connections.		
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#### GALL REPORT – MECHANICAL DISCIPLINE COMMENTS SECTION VIIE.5

GALL SECTION	TTTLE	ITEMNO	PACE	COMMENT
VII E5-1		E5.1.2	VII E5-4	Item E5.1.1 is a TLAA. We will capture this item in our activity to identify and describe TLAAs in the Standard Review Plan.
VII E5-2	Shutdown Cooling (Older BWR)	E5.1.1	VII E5-5 VII E5-7 VII E5-15 VII E5-17	Replace text in the Aging management program column to reflect that Primary Water Chemistry and Inservice Inspection for Class 1, 2 and 3 components are the aging management programs. Also, revise the text in the Evaluation and Technical basis column to reference proposed GALL Chapter XI and the discussion of the Primary Water Chemistry and ISI programs
VII E5-3		E5.2.1	VII E5-13	Replace text in the Aging management program column to reflect that Inservice Inspection for Class 1, 2 and 3 components is the aging management program. Also, revise the text in the Evaluation and Technical basis column to reference proposed GALL Chapter XI and the discussion of the ISI program.
VII E5-4		E5.3.1	VII E5-19	Replace text in the Aging management program column to reflect that Primary Water Chemistry as the aging management program. Also, revise the text in the Evaluation and Technical basis column to reference proposed GALL Chapter XI and the discussion of the Primary Water Chemistry program.

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#### F1. Control Room Area Ventilation System

#### System, Structures, and Components

The system, structures, and components included in this table comprise the control room area ventilation system which contain ducts, piping and fitting, equipment frames and housings, flexible collars and seals, and heating and cooling air handlers.

#### System Interfaces

The system that interface with the control room area ventilation system is the auxiliary and radwaste area ventilation system (Table VII F2).

	Structure and	Region of	1	Environ-	Adind	Aging	· · · · · · · · · · · · · · · · · · ·
Item	Component	Interest	Material	ment	Effect	Mechanism	References
F1.1.1 F1.1.2	Duct	Duct Fittings. and Access Doors. Equipment	Carbon Steel (CS) (Galvanized or Painted) Painted)	Warm. Moist Air	Loss of Material	General. Microbiolo gically- Influenced.	NRC IN 82-43. NRC Reg. Guide 1.52.
		Frames and Housing	Bolts: Plated CS			Crevice Corrosion	
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#### F1. CONTROL ROOM AREA VENTILATION SYSTEM

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Plant Specific Aging Management Activity **JTT** AUXILIARY SYSTEMS CONTROL ROOM AREA VENTILATION SYSTEM E1 Further Existing Aging Management Program (AMP) Evaluation and Technical Basis Evaluation The AMP should rely on routine visual (1) Scope of Program: The AMP should focus on managing Yes, no inspection by conducting system the integrity of all ducts, fittings and equipment frames generic ĀMP walkdowns to obtain early detection of and housings in the ventilation system used to provide air significant degradation of system to the control room area. (2) Preventive Actions: Periodic components, such as ducting, fan plant system walkdowns and visual inspection should be housings. damper frames, heat undertaken to assure that the corrosion is not occurring. (3) Parameters Monitored/ Inspected: The parameters exchanger housing, and other items for evidence of any corrosion, wear, or inspected should include evidence of material loss such as other indications of degradation. holes, pitting and rust buildup. The moisture level should be examined periodically at susceptible locations of Socitic components to ensure acceptable levels of moisture in the air throughout the system. Additional parameters should tivities / Programs include evidence of tearing of elastomeric flexible collars. excessive wear and/or hardness of elastomeric seals on dampers, and loosening of bolts anchoring equipment. (4) Detection of Aging Effects: General porrosion, microbiologically-influenced corrosion, crevice corrosion, and pitting corrosion may occur in sections of the duct exposed to the warm and moist air particularly in areas such as low spots in the duct. Degradation of duct and fittings becomes evident by observation of pitting. rust, degradation of paint and other coatings, and the appearance of small holes. Additional examination techniques should be considered to detect effects of corrosion especially in areas not easily detected from the walkdowns. (5) Monitoring and Trending: Certain areas not easily inspected due to poor access or other impediments, should be inspected by gaining access through manway or other access doors. The results of inspections should be used to determine the frequency of any future inspections. (6) Acceptance Criteria: Any appearance of excessive rust, pitting, and buildup of foreign material on the surfaces of the ducts, fittings, and bolting should be reported and evaluated. Appearances of tearing, excessive wear, or other distress of elastomer flexible collars and/or seals should also be reported and evaluated. (7-9) Corrective Actions, Confirmation Process, and Administrative Controls: Site corrective actions programs, QA procedures, site review and approval processes, and administrative controls are implemented in accordance with Appendix B to 10 CFR Part 50 requirements and will continue to be adequate for license renewal. (10) Operating Experience: General corrosion, microbiologically-influenced corrosion. crevice corrosion, and pitting corrosion may occur in sections of the dact exposed to the warm and moist air particularly/in areas such as low spots in the duct. In some cases, the

Information Notice IN 82-43].

humidity level in the system far exceeded the level (70%) recommended in Regulatory Guide 1.52 (See NRC

#### VII AUXILIARY SYSTEMS F1. CONTROL ROOM AREA VENTILATION SYSTEM

<b>ال</b> 	1. CONTROL	Region of		Environ-	Aging	Aging	
Itom	Structure and	Interest	Material	ment	Effect	Mechanism	References
F1.1.3	Delete, NotA TLAA FI-4	Flexible Collars Between Ducts and Fans. Seals in Dampers and Doors	Elastomer (Neoprene)	Warm. Moist Air	Hardening and Loss of Strength	Elastomer Degradatio n From Heating and Radiation	NRC IN 82-43. NRC Reg. Guide 1.52. NRC IN 82-43.
F1.1.3 F1.1.4	Duct	Flexible Collars Between Ducts and Fans, Seals in Dampers and Doors	Elastomer (Neoprene)	Warm, Moist Air	Attrition	wear	NRC IN 82-43
F1.2.1	Air Handler Heating/ Cooling	Heating/ Cooling Coils	Copper/ Nickel	Warm. Moist Air	LOSS OI Material	Microbiolo gically- influenced, Pitting, and Crevice Corrosion	NRC Reg. Guide 1.52.
F1.3.1	Piping	Piping and Fittings	CS	Hot or Cold Treated Water	Loss of Material	General, Microbiolo gically- Influenced, Pitting, and Crevice Corrosion	NRC IN 52-43. NRC Reg. Guide 1.52.

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	F1. CONTROL ROOM AREA VI	ENTILATION SYSTEM	$\frown$	
	Existing		Further	
	Aging Management Program (AMP)	Evaluation and Technical Basis	Evaluation	
5	Same as for Capatal Microbiologicality	Same as for General Microhiologically-Influenced	Yes, TLAA	
- 7	Influenced Pitting and Crewice	Pitting and Crewice Corrosion for Items F1.1.1 duct	/	
	Comparent for Itoms EL L L dust fittings	fittings and access doors and F1 12 mument frames	ノ	
	Corrosion for items F1.1.1 duct, juliugs,	and housings		
	ana access abors, and F1.1.2, equipment	and house of the lead aging analysis (TI AA) of the		
/	jrames and housings.	In addition, a une nimited aging analysis (TEAR) of the		
/	In addition, several properties of	elastomer should be performed for the extended period of	////	
1	elastomers change over time and with	license renewat.	r	
\	exposure to temperature changes and			
	oxygen. Elastomers generally harden as	1-ATTA		
	they age, making sealing more difficult.	10TATEN /		
	If allowed to proceed, some of the			
-	changes in the material may result in			
	tearing of elastomer flexible collars.			
	and/or seals, and in failure to seal the			
	joint tightly. Therefore, a time-limited			
	aging analysis (TLAA) of the elastomer			
	should be performed for the extended			
	period of license renewal.			
	Same as for General Microbiologically-	Same as for General, Microbiologically-Influenced,	Yes, no	
	Influenced Pitting and Crevice	Pitting, and Crevice Corrosion for Items F1.1.1 duct,	generic	
	Corresion for Items F1 1 1 duct fittings.	fittings, and access doors, and F1.1.2, equipment frames	AMP	
	and access doors and FL12 equipment	and housings		
	former and housings		1	
i	Direct approxible a ging management	Plant-specific aging management program is to be	Yes, no	
	Plant-specific aging management	mainspecific aging management program as to be	generic	
	program.		AMP	
				$\sim$
		4AV2		
	$\sim$	Karn a di Luci hannan	Lucian	of the
		Section XI TO POULUS	mann	
		(A) Course of the ANCE - Institute former on managing	Vec TO	Clasat 1
	The AMP should rely on routine visual	the integrity of all pining and fittings in the ventilation	deneric	Contina
	inspection by conducting plant-wide	the integrity of an piping and interiors in the ventual dat	AMD	carry
	walkdowns to obtain early effection of	system used to provide at to the control room areas (2)		linter 1
	significant degradation of system	Preventibe Actions: Perious plant System walk owns and		d
	components for evidence of any	risual inspection should be undertaken to assure that the		(Lenus 4)
$\setminus$	corrosion or other indications of	corrosion is not occurring. (3) Parameters in printered,		Dreman
	degradation. This inspection should	inspected. The parameters inspected should provide the		program
	also include ultrasonic thickness	evidence of any corrosion of other indications of		1 5
	measurement at susceptible locations.	degradation. (4) Detection of Ayung Bijects: General		_/
- \	Alacat copling water 1	corrosion, microbiologically-initizenced corrosion,	1 1	
	CLOSE COUNT WATER	crevice corrosion, and pitting corrosion may occur in		
	chamicon/	sections of the piping exposed to the warm and moist air		
	Une missing	particularly in areas such as low spots in the piping.		
		Therefore, inspection of representative components and		
		susceptible locations should be undertaken to provide		
		additional assurance that significant corrosion is not		
		occurring. This inspection should be visual, and		
		ultrasonic thickness measurement at susceptible	ļ	
		locations should also be undertaken to assure that		
		significant corrosion is not occurring. (5) Monitoring and		
		Trending: The results of inspections should be used to	1	
		determine the frequency of any future inspections.	1	
		(6) Acceptance Criteria: Any degradation found in visual	( I	
		inspection and UT measurement should be reported and	1	
		evalytated. (7-9) Corrective Actions, Confirmation	į I	
		Process, and Administrative Controls: Site corrective	t I	
		actions	l]	

#### VII

## AUXILIARY SYSTEMS F1. CONTROL ROOM AREA VENTILATION SYSTEM

Item	Structure and Component	Region of Interest	Material	Environ- ment	Aging Effect	Aging Mechanism	References
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FI. CONTROL ROOM AREA V	ENTIFICITOR STOTEM		
Existing Aging Management Program (AMP)	Evaluation and Technical Basis		Further Evaluation
······································	(continued from previous page) programs, QA procedures, site review and approprocesses, and administrative controls are implined in accordance with Appendix B to 10 CFR Part 50 requirements and will continue to be adequate for renewal. (10) Operating Experience: General comicrobiologically-influenced corrosion, crevice corrosion, and pitting corrosion may occur in set the piping exposed to the warm and moist air pain areas such as low spots in the piping. In some humidity level in the system far exceeded the lever recommended in Regulatory Guide 1.52 (See NRC Information Notice IN 82-43).	val emented or license rrosion, ections of articularly cases, the rel (70%)	

### GALL REPORT-MECHANICAL DISCIPLINE COMMENTS SECTION VIIF.1

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GALL SECTION	TITLE	ITEM NO	PAGE	COMMENT
VII F1-1	Aux. Systems Control Room Ventilation	All	VII F1-4 Through 9	Most sections have the statement 'No generic AMP' in the Further Evaluation column. Recommend these sections state 'Plant-specific aging management program/activity' in the Existing Aging Management Program column and 'Plant-specific aging management program/activity required' in the Evaluation and Technical Basis column.
VII F1-3	Aux. Systems Control Room Ventilation	F1.3.1	VII F1-6 and 7	General Corrosion, Crevice Corrosion, Pitting, and MIC are listed as Aging Mechanisms for the interior of Piping. The chemistry program should be the applicable as existing aging management program.
VII F1-4	Aux. Systems Control Room Ventilation	F1.1.3 and F1.1.4	VII F1-6 and 7	For the Elastomer Degradation Aging Mechanism entries, the reference to 'performing a TLAA' is inappropriate. BASIS: A TLAA is an existing calculation or analysis that meets certain specific criteria and that must be dispositioned in one of several acceptable ways for the period of extended operation. Since there is no information presented that suggests the existence of such a calculation, inclusion of any reference to a TLAA in this entry is incorrect and should be removed.

### F2. Auxiliary and Radwaste Area Ventilation System

F2.1 Duct

- F2.1.1 Duct, Fittings, and Access Doors
- F2.1.2 Equipment Frames and Housing
- F2.1.3 Flexible Collars between Ducts and Fans
- F2.1.4 Seals in Dampers and Doors
- F2.2 Air Handler Heating/Cooling
  - F2.2.1 Heating/Cooling Coils
- F2.3 Piping

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F2.3.1 Piping and Fittings

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#### F2. Anxiliary and Radwaste Area Ventilation System

#### System, Structures, and Components

The system, structures, and components included in this table comprise the auxiliary and radwaste areas ventilation system and contain ducts, piping and fitting, equipment frames and housings, flexible collars and seals, and heating and cooling air handlers. Based on US Nuclear Regulatory Commission Regulatory Guide 1.26, "Quality Group Classifications and Standards for Water, Steam, and Radioactive-Waste-Containing Components of Nuclear Power Plants," all components in the auxiliary and radwaste area ventilation system are classified as Group B Quality Standards.

#### System Interfaces

The system that interfaces with the auxiliary and radwaste area ventilation system is the control room area ventilation system (Table VII F1).

I	2. AUXILIAR	Y AND RADWAS	SIL AREA VE		Ading	Aging	
[	Structure and	Region of	Matarial	Environ-	Effect	Mechanism	References
Item	Component	Interest	Material	Warm	Loss of	General,	NRC IN 82-43.
F2.1.1	Duct	Duct Fittings,	Galvanized	Moist Air	Material	Microbiolog	NRC Reg. Guide
F2.1.2		Doors	or Painted)		1	ically-	1.52.
]		Equipment	Bolts: Plated			Influenced,	
		Frames and	cs			Pitting, and	
		Housing				Crevice	
						Corrosion	
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Plantspecific aging Managomout program/activity required

AUXILIARY SYSTEMS	STE AREA VENTILATION SYSTEM	_
F.2 AUAILIANT AND REDUIL		Further
Aging Management Program (AMP)	Evaluation and Technical Basis	Evaluation
Aging Management rogram (2011)	(1) Scond of Program: The AMP should focus on managing	Yes, no
The Alvir Should rely of fourthe vision	the integrity of all ducts, fittings and equipment frames	generic
mikdowns to obtain early detection of	and housings in the ventilation system used to provide air	AMP
ignificant degradation of system	to the auxiliary and radwaste area. (2) Preventive Actions:	l í
components such as ducting, fan	Periodic plant system walkdowns and visual inspection	
ousings, damper frames, heat	should be undertaken to assure that the corrosion is not	1
xchanger beusing, and other items for	occurring. (3) Parameters Monitored/Inspected: The	
vidence of any corrosion, wear, or	parameters inspected should include evidence of material	
ther indications of degradation.	loss such as holes, pitting and rust buildup. The moisture	
	level should be examined periodically at susceptible	I V
Mant Specific	locations of components to ensure acceptable levels of	1
	moisture in the air throughout the system. Additional	/
Laing Management	parameters should include evidence of tearing of	
	elastomenio fiexible collars, excessive wear and loosening	N N
N' 1' Fipe Illana ar	af holds a rehoring equipment (4) Detection of Aging	1
HOHVING / MOGRATIS	Fifeste: General corrosion, microbiologically-influenced	
/ /	corrosion crevice corrosion, and pitting corrosion may	
	occur in sections of the duct exposed to the warm and	4
	moist air particularly in areas such as low spots in the	1 //
	duct. Degradation of duct and fittings becomes evident by	/
	observation of pitting, rust, degradation of paint and other	/
	coatings, and the appearance of small holes. Additional	
	examination techniques should be considered to detect	
	effects of corrosion especially in areas not easily detected	
	from the walkdowns (5) Monitoring and Trending:	
	Certain areas not easily inspected due to poor access or	
	other impediments, should be inspected by gaining access	
	through many ay or other access doors. The results of	
	inspections should be used to determine the frequency of	
	any future inspections. (6) Accentionse criteritie say	
	appearance of excessive rust, pitting, and building of	
	toreign material on the surfaces of the didets intellings, and	
	bolting should be reported and evaluated. Appendiate of	
	fearing, excessive wear, or briner under or emported and	
	methode contais and or seems confirmation Process	
	and Administrative Controls: Site corrective actions	
	programs. QA procedures, site review and approval	
	processes, and administrative controls are implemented	
	in accordance with Appendix B to 10 CFR Part 50	
	requirements and will continue to be adequate for license	
	renewal. (10) Operating Experience: General corrosion.	
	microbiologically influenced corrosion, crevice	
$\backslash$	corrosion, and pitting corrosion may occur in sections of	
$\backslash$	the duct exposed to the warm and moist air particularly in	
$\mathbf{X}$	areas such as low spots in the duct. In some cases, the	1
	humidity level in the system far exceeded the level (70%)	
$\mathbf{i}$	recommended in Regulatory Guide 1.52 (See NRC	
<u>\</u>	Information Notice IN 62-45].	استىيىتىكى ال
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VII	AUXI	LIARY SYSTEMS
	F2.	AUXILIARY AND RADWASTE AREA VENTILATION SYSTEM

FZ. AUAILIARI AND RADWASTE AREA VENTILATION STOTEM							
Here	Structure and Component	Region of Interest	Material	Environ- ment	Aging Effect	Aging Mechanism	References
F2.1.3 F2.1.4	Nor A TLAA	Flexible Collars Between Ducts and Fans. Seals in Dampers and Doors	Elastomer (Neoprene)	Warm. Moist Air	Hardening and Loss of Strength	Elastomer Degradation From Heating and Radiation	NRC IN 82-43. NRC Reg. Guide 1.52.
	F2-5	Flovible	Flactomer	Warm	Attrition	Wear	NRC IN 82-43.
F2.1.3 F2.1.4	Duct	Collars Between Ducts and Fans, Seals in Dampers and Doors	(Neoprene)	Moist Air			NRC Reg. Guide 1.52.
F2.2.1	Air Handler Heating/ Cooling	Heating/ Cooling Coils	Copper/ Nickel	Warm, Moist Air	Loss of Material	General, Microbiolog ically- Influenced, Pitting, and Crevice Corrosion	NRC IN 82-43. NRC Reg. Guide 1.52.
F2.3.1	Piping	Piping and Fittings	Carbon Steel	Hot or Cold Treated Water	Loss of Material	General, Microbiolog ically- Influenced, Pitting, and Crevice Corrosion	NRC IN 82-43. NRC Reg. Guide 1.52.
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#### AUXILIARY SYSTEMS VII

### AUXILIARY AND RADWASTE AREA VENTILATION SYSTEM



F2. AUXILIARY AND RADWASTE AREA VENTILATION STSTEM							
Item	Structure and Component	Region of Interest	Material	ment	Effect	Mechanism	References
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#### VII

# AUXILIARY SYSTEMS F.2 AUXILIARY AND RADWASTE AREA VENTILATION SYSTEM

Existing Aging Management Program (AMP)	Evaluation and Technical Basis	Further Evaluation
-	(continued from previous page) evaluated. (7-9) Corrective Actions, Confirmation Process, and Administrative Controls: Site corrective actions programs, QA procedures, site review and approval processes, and administrative controls are implemented in accordance with Appendix B to 10 CFB Part 50 requirements and will continue to be adequate for license renewal. (10) Operating Experience: General corrosion, microbiologically-influenced corrosion, crevice corrosion, and pitting corrosion may occur in sections of the piping exposed to the warm and moist air particularly in areas such as low spots in the piping. In some cases, the humidity level in the system far exceeded the level (70%) recommended in Regulatory Guide 1.52 (See NRC Information Notice IN 82-43).	8

### GALL REPORT-MECHANICAL DISCIPLINE COMMENTS SECTION VIIF.2

GALL SECTION	TITLE	ITEM NO	PACE	COMMENT
VII F2-1	Aux. Systems	All	VII F2-4	Most sections have the statement 'No generic AMP' in the Further
	Auxiliary and Redwaste Area		I hrough 9	Evaluation column. Recommend these sections state 'Plant-specific aging management program/activity' in the Evicting Aging
	Ventilation			Management Program column and 'Plant-specific aging
				management program/activity required in the Evaluation and
				Technical Basis column.
VII F2-4	Aux. Systems	F2.3.1	VII F2-6	General Corrosion, Crevice Corrosion, Pitting; and MIC are listed
	Auxiliary and		and 7	as Aging Mechanisms for the interior of Piping. The chemistry
	Radwaste Area			program should be the applicable as existing AMP. Refer to AMA
	Ventilation			titled 'Chemistry Program (Closed Cooling).'
VII F2-5	Aux. Systems	F2.1.3 and	VII F2-6	For the Elastomer Degradation Aging Mechanism entries, the
	Auxiliary and	F2.1.4	and 7	reference to 'performing a TLAA' is inappropriate.
	Radwaste Area			BASIS: A TLAA is an existing calculation or analysis that meets
	Ventilation			certain specific criteria and that must be dispositioned in one of
				several acceptable ways for the period of extended operation. Since
				there is no information presented that suggests the existence of such
				a calculation, inclusion of any reference to a TLAA in this entry is
				incorrect and should be removed.

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# F3. Engineered Safety Feature Ventilation System (Primary Containment Area)

F3.1 Duct

- F3.1.1 Duct, Fittings, and Access Doors
- F3.1.2 Equipment Frames and Housing
- F3.1.3 Flexible Collars between Ducts and Fans
- F3.1.4 Seals in Dampers and Doors
- F3.2 Air Handler Heating/Cooling
  - F3.2.1 Heating/Cooling Coils
- F3.3 Piping
  - F3.3.1 Piping and Fittings

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#### F3. Engineered Safety Feature Ventilation System (Primary Containment Area)

#### System, Structures, and Components

The system, structures, and components included in this table comprise the primary containment heating and ventilation system which contain ducts, piping and fitting, equipment frames and housings, flexible collars and seals, and heating and cooling air handlers. Based on US Nuclear Regulatory Commission Regulatory Guide 1.26, "Quality Group Classifications and Standards for Water, Steam, and Radioactive-Waste-Containing Components of Nuclear Power Plants," all components in the primary containment heating and ventilation system are classified as Group C Quality Standards.

#### System Interfaces

The system that interfaces with the primary containment heating and ventilation system is the closed cycle cooling water system (Table VII C2).

#### AUXILIARY SYSTEMS vп

1	F3. PRIMARY	CONTAINMENT	nearmon		A	Adina	
	Structure and	Region of	Material	Environ- ment	Aging Effect	Mechanism	References
EQ 1	Duet	Duct Fittings	cs	Warm,	Loss of	General,	NRC IN 82-43.
F2 10	Duci	and Access	Galvanized	Moist Air	Material	Micro-	NRC Reg. Guide
F3.1.2	1	Doors.	or Painted)			biologically	1.52.
		Equipment	Bolts: Plated			-Influenced.	
		Frames and	cs			Pitting, and	
		Housing				Crevice	
						Corrosion	
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#### C AND VENTUATION SYSTEM

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Plant specific aging Management program/activity required

AUXILIARY SYSTEMS F3. PRIMARY CONTAINMENT HEATING AND VENTILATION SYSTEM



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VII	AUXI	LIARY SYSTEMS	
	F3.	PRIMARY CONTAINMENT HEATING AND VENTILATION SYSTEM	_

	S. FRIMARI	CONTINUES					
ILETT	Structure and Component	Region of Interest	Material	Environ- ment	Aging Effect	Aging Mechanism	References
F3.1.3 F3.1.4	Duct Deleto I Jern F3-5	Flexible Collars Between Ducts and Fans, Seals in Dampers and Doors	Elastomer (Neoprene)	Warm, Moist Air	Hardening and Loss of Strength	Elastomer Degradation From Heating and Radiation	NRC IN 82-43. NRC Reg. Guide 1.52.
F3.1.3 F3.1.4	Duct	Flexible Collars Between Ducts and Fans. Seals in Dampers and Doors	Elastomer (Neoprene)	Warm, Moist Air	Attrition	Wear	NRC IN 82-43. NRC Reg. Guide 1.52.
F3.2.1	Air Handler Heating/ Cooling	Heating/ Cooling Coils	Copper/ Nickel	Warm, Moist Air	Loss of Material	General, Micro- biologically -Influenced, Pitting, and Crevice Corrosion	NRC IN 82-43. NRC Reg. Guide 1.52.
F3.3.1	Piping	Piping and Fittings	Carbon Steel	Hot or Cold Treated Water	Loss of Material	General, Micro- biologically -Influenced, Pitting, and Crevice Corrosion	NRC IN 82-43. NRC Reg. Guide 1.52.

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#### F3. PRIMARY CONTAINMENT HEATING AND VENTILATION SYSTEM

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Existing		Further
Aging Management Program (AMP)	Evaluation and Technical Basis	Evaluation
Same as for General. Microbiologically	Some as for General, Microbiologically-Influenced.	Yes TLAS
Influenced, Pitting, and Crevice	Pitting, and Crevice Corrosion for Items F3 1.1 duce	
Corrostan for Items F3.1.1 duct. fittings	fittings and access doors and F3 1.2 aquinment frames	
and access doors and F3 1 2 equipment	and howings. Is addition a time list that make the	1
frames and pusines in addition	and housings. In addition, a time limited aging analysis	
frames and nousings. In addition,	(ILAA) of the elastomer should be performed for the	
several properties of elastomers change	extended period of license renewal.	
over time and with exposure to	m	
temperature changes and oxygen.		
Elastomers generally haven as they-		
age, making sealing more difficult. If	+ 12.5	
allowed to proceed some of the change		
in the motorial max moult in the starte and		
ni the material may result in tearing of		
elastomer nexine conars, and/or seals.		1
and in failure to seal the joint tightly.		
Therefore, a time-limited aging		
analysis (TLAA) of the elastomer should		1
be performed for the extended period &		ł
ligense renewal.		
Same on for Canani Ministri		
Sume as for General, Microbiologically-	Same as for General. Microbiologically-Influenced.	Yes, no
Injuencea, Pitting, and Crevice	Pitting, and Crevice Corrosion for Items F3.1.1 duct,	generic
Corrosion for Items F3.1.1 duct, fittings,	fittings, and access doors and F3.1.2 equipment frames	ÂMP
and access doors and F3.1.2 equipment	and housings.	
frames and housings.		
- <b>-</b>		
Plant-specific aging management	Diant analitic artist many data	
namespecific aging management	Figure-specific aging management program is to be	Yes, no
program.	evaluated.	generic
		AMP
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		_
		$\frown$ I
The AMP should rely on contine vision	(1) Score of Program: The AMP church former	V
		YES. 110
inspection by conducting plant-ride	the interrity of all piping and States to the	
inspection by conducting plant wide	the integrity of all piping and fittings in the ventilation	generic
inspection by conducting plant wide walkdowns to obtain early detection of	the integrity of all piping and fittings in the ventilation system used to provide air to the primary containment	generic AMP
inspection by conducting plant wide walkdowns to obtain early detection of significant degradation of system	the integrity of all piping and fittings in the ventilation system used to provide air to the primary containment area. (2) Preventive Actions: Periodic plant system	generic AMP
inspection by conducting plant wide walkdowns to obtain early detection of significant degradation of system components for endence of any	the integrity of all piping and fittings in the ventilation system used to provide air to the primary containment area. (2) Preventive Actions: Periodic plant system walkdowns and visual inspection should be undertaken to	generic AMP
inspection by conducting plant wide walkdowns to obtain early detection of significant degradation of system components for endence of any corrosion or other indications of	the integrity of all piping and fittings in the ventilation system used to provide air to the primary containment area. (2) Preventive Actions: Periodic plant system walkdowns and visual inspection should be undertaken to assure that the corrosion is not occurring (3) Parameters	generic AMP
inspection by conducting plant-wide walkdowns to obtain early detection of significant degradation of system components for endence of any corrosion or other indications of degradation. This inspection should	the integrity of all piping and fittings in the ventilation system used to provide air to the primary containment area. (2) Preventive Actions: Periodic plant system walkdowns and visual inspection should be undertaken to assure that the corrosion is not occurring (3) Parameters Monitored/Inspected: The parameters inspected should	generic AMP
inspection by conducting plant wide walkdowns to obtain early detection of significant degradation of system components for redence of any corrosion or other indications of degradation. This inspection should also include ultrasonic thickness	the integrity of all piping and fittings in the ventilation system used to provide air to the primary containment area. (2) Preventive Actions: Periodic plant system walkdowns and visual inspection should be undertaken to assure that the corrosion is not occurring (3) Parameters Monitored/Inspected: The parameters inspected should provide for evidence of any corrosion or other indications	generic AMP
inspection by conducting plant wide walkdowns to obtain early detection of significant degradation of system components for widence of any corrosion or other indications of degradation. This inspection should also include ultrasonic thickness measurement at susceptible locations.	the integrity of all piping and fittings in the ventilation system used to provide air to the primary containment area. (2) Preventive Actions: Periodic plant system walkdowns and visual inspection should be undertaken to assure that the corrosion is not occurring (3) Parameters Monitored/Inspected: The parameters inspected should provide for evidence of any corrosion or other indications of degradation. (4) Detection of Aring Efforts: Conem!	generic AMP
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inspection by conducting plant wide walkdowns to obtain early detection of significant degradation of system components for ordence of any corrosion or other indications of degradation. This inspection should also include ultrasonic thickness infrasurement at susceptible locations.	the integrity of all piping and fittings in the ventilation system used to provide air to the primary containment area. (2) Preventive Actions: Periodic plant system walkdowns and visual inspection should be undertaken to assure that the corrosion is not occurring (3) Parameters Monitored/Inspected: The parameters inspected should provide for evidence of any corrosion or other indications of degradation. (4) Detection of Aging Effects: General corrosion, microbiologically-influenced corrosion, creming corrosion and citize corrosion.	generic A MP
inspection by conducting plant-wide walkdowns to obtain early detection of significant degradation of system components for widence of any corrosion or other indications of degradation. This inspection should also include ultrasonic thickness masurement at susceptible locations.	the integrity of all piping and fittings in the ventilation system used to provide air to the primary containment area. (2) Preventive Actions: Periodic plant system walkdowns and visual inspection should be undertaken to assure that the corrosion is not occurring (3) Parameters Monitored/Inspected: The parameters inspected should provide for evidence of any corrosion or other indications of degradation. (4) Detection of Aging Effects: General corrosion, microbiologically influenced corrosion, crevice corrosion, and piving corrosion may occur in	generic A MP
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inspection by conducting plant-wide walkdowns to obtain early detection of significant degradation of system components for endence of any corrosion or other indications of degradation. This inspection should also include ultrasonic thickness infasurement at susceptible locations. CLOSED (cooling WOHER Chemistry	the integrity of all piping and fittings in the ventilation system used to provide air to the primary containment area. (2) Preventive Actions: Periodic plant system walkdowns and visual inspection should be undertaken to assure that the corrosion is not occurring (3) Parameters Monitored/Inspected: The parameters inspected should provide for evidence of any corrosion or other indications of degradation. (4) Detection of Aging Effects: General corrosion, microbiologically-influenced corrosion, crevice corrosion, and piting corrosion may occur in sections of the piping exposed to the warm, moist air within the containment area, particularly in areas such as low spots in the piping. Therefore, inspection of representative components and susceptible locations should be undertaken to provide additional assurance that significant corrosion is not occurring. This inspection should be visual, and ultrasonic thickness measurement at susceptible locations should also be undertaken to assure that significant corrosion is not occurring. (5) Monitoring and Trending: The results of inspections should be used to determine the frequency of any future inspections. (6) Acceptance Criteria: Any degradation fund in visual inspection and UT measurement should See ChapterX1 for McWallafior	generic AMP
inspection by conducting plant-wide walkdowns to obtain early detection of significant degradation of system components for endence of any corrosion or other indications of degradation. This inspection should also include ultrasonic thickness infasurement at susceptible locations. CLOSED Cooling Water Chemistry	the integrity of all piping and fittings in the ventilation system used to provide air to the primary containment area. (2) Preventive Actions: Periodic plant system walkdowns and visual inspection should be undertaken to assure that the corrosion is not occurring (3) Parameters Monitored/Inspected: The parameters inspected should provide for evidence of any corrosion or other indications of degradation. (4) Detection of Aging Effects: General corrosion, microbiologically-influenced corrosion, crevice corrosion, and pitting corrosion may occur in sections of the piping exposed to the warm, moist air within the containment area, particularly in areas such as low spots in the piping. Therefore, inspection of representative components and susceptible locations should be undertaken to provide additional assurance that significant corrosion is not occurring. This inspection should be visual, and ultrasonic thickness measurement at susceptible locations should also be undertaken to assure that significant corrosion is not occurring. (5) Monitoring and Trending: The results of inspections should be used to determine the frequency of any future inspections. (6) Acceptance Criteria: Any degradation fund in visual inspection and UT measurement should compared for any future inspections. (6) Acceptance Criteria: Any degradation fund in visual inspection and UT measurement should	generic AMP Program
inspection by conducting plant-wide walkdowns to obtain early detection of significant degradation of system components for endence of any corrosion or other indications of degradation. This inspection should also include ultrasonic thickness unasurement at susceptible locations. CLOSEC Cooling Water Chemistry	the integrity of all piping and fittings in the ventilation system used to provide air to the primary containment area. (2) Preventive Actions: Periodic plant system walkdowns and visual inspection should be undertaken to assure that the corrosion is not occurring (3) Parameters Monitored/Inspected: The parameters inspected should provide for evidence of any corrosion or other indications of degradation. (4) Detection of Aging Effects: General corrosion, microbiologically-influenced corrosion, crevice corrosion, and pixing corrosion may occur in sections of the piping exposed to the warm, moist air within the containment area, particularly in areas such as low spots in the piping. Therefore, inspection of representative components and susceptible locations should be undertaken to provide additional assurance that significant corrosion is not occurring. This inspection should be visual, and ultrasonic thickness measurement at susceptible locations should also be undertaken to assure that significant corrosion is not occurring. (5) Monitoring and Trending: The results of inspections should be used to determine the frequency of any future inspections. (6) Acceptance Criteria: Any degradation form in visual inspection and UT measurement should See ChapterX1 for MCWallafior of Hie Closed Cooling Waler Chemister	generic AMP Program
inspection by conducting plant-wide walkdowns to obtain early detection of significant degradation of system components for endence of any corrosion or other indications of degradation. This inspection should also include ultrasonic thickness unasurement at susceptible locations. CLOSEC Cooling Water Chemistry	the integrity of all piping and fittings in the ventilation system used to provide air to the primary containment area. (2) Preventive Actions: Periodic plant system walkdowns and visual inspection should be undertaken to assure that the corrosion is not occurring (3) Parameters Monitored/Inspected: The parameters inspected should provide for evidence of any corrosion or other indications of degradation. (4) Detection of Aging Effects: General corrosion, microbiologically influenced corrosion, crevice corrosion, and piving corrosion may occur in sections of the piping exposed to the warm, moist air within the containment area, particularly in areas such as low spots in the piping. Therefore, inspection of representative components and susceptible locations should be undertaken to provide additional assurance that significant corrosion is not occurring. This inspection should be visual, and ultrasonic thickness measurement at susceptible locations should also be undertaken to assure that significant corrosion is not occurring. (5) Monitoring and Trending: The results of inspections should be used to determine the frequency of any future inspections. (6) Acceptance Criteria: Any degradation form in visual inspection and UT measurement should See ChapterX1 for Mexiev Chemister VII F3-7 DRAFT - 1	Program 2/06/99
inspection by conducting plant-wide walkdowns to obtain early detection of significant degradation of system components for endence of any corrosion or other indications of degradation. This inspection should also include ultrasonic thickness unasurement at susceptible locations. CLOSEC (coling WHER Chemistry	the integrity of all piping and fittings in the ventilation system used to provide air to the primary containment area. (2) Preventive Actions: Periodic plant system walkdowns and visual inspection should be undertaken to assure that the corrosion is not occurring (3) Parameters Monitored/Inspected: The parameters inspected should provide for evidence of any corrosion or other indications of degradation. (4) Detection of Aging Effects: General corrosion, microbiologically influenced corrosion, crevice corrosion, and piting corrosion may occur in sections of the piping exposed to the warm, moist air within the containment area, particularly in areas such as low spots in the piping. Therefore, inspection of representative omponents and susceptible locations should be undertaken to provide additional assurance that significant corrosion is not occurring. This inspection should be visual, and ultrasonic thickness measurement at susceptible locations should also be undertaken to assure that significant corrosion is not occurring. (5) Monitoring and Trending: The results of inspections should be used to determine the frequency of any future inspections. (6) Acceptance Criteria: Any degradation found in visual inspection and UT measurement should See ChapterX1 for an Evaluation fund in visual inspection and UT measurement should VII F3-7 DRAFT - 1	Program 2/06/89
inspection by conducting plant-wide walkdowns to obtain early detection of significant degradation of system components for endence of any corrosion or other indications of degradation. This inspection should also include ultrasonic thickness infasurement at susceptible locations. CLOSEC (coling WHER Chemistry	the integrity of all piping and fittings in the ventilation system used to provide air to the primary containment area. (2) Preventive Actions: Periodic plant system walkdowns and visual inspection should be undertaken to assure that the corrosion is not occurring (3) Parameters Monitored/Inspected: The parameters inspected should provide for evidence of any corrosion or other indications of degradation. (4) Detection of Aging Effects: General corrosion, microbiologically-influenced corrosion, crevice corrosion, and pitting corrosion may occur in sections of the piping exposed to the warm, moist air within the containment area, particularly in areas such as low spots in the piping. Therefore, inspection of representative components and susceptible locations should be undertaken to provide additional assurance that significant corrosion is not occurring. This inspection should be visual, and ultrasonic thickness measurement at susceptible locations should also be undertaken to assure that significant corrosion is not occurring. (5) Montoring and Trending: The results of inspections should be used to determine the frequency of any future inspections. (6) Acceptance Criteria: Any degradation form in visual inspection and UT measurement should See ChapterX1 for Mexalleditor VII F3-7 DRAFT - 1	Program 2/06/99
inspection by conducting plant-wide walkdowns to obtain early detection of significant degradation of system components for endence of any corrosion or other indications of degradation. This inspection should also include ultrasonic thickness infasurement at susceptible locations. CLOSED Cooling WOHER Chemistry	the integrity of all piping and fittings in the ventilation system used to provide air to the primary containment area. (2) Preventive Actions: Periodic plant system walkdowns and visual inspection should be undertaken to assure that the corrosion is not occurring (3) Parameters Monitored/Inspected: The parameters inspected should provide for evidence of any corrosion or other indications of degradation. (4) Detection of Aging Effects: General corrosion, microbiologically-influenced corrosion, crevice corrosion, and piting corrosion may occur in sections of the piping exposed to the warm, moist air within the containment area, particularly in areas such as low spots in the uping. Therefore, inspection of representative components and susceptible locations should be undertaken to provide additional assurance that significant corrosion is not occurring. This inspection should be visual, and ultrasonic thickness measurement at susceptible locations should also be undertaken to assure that significant corrosion is not occurring. (5) Montoring and Trending: The results of inspections should be used to determine the frequency of any future inspections. (6) Acceptance Criteria: Any degradation fund in visual inspection and UT measurement should See ChapterX1 for an evaluation fund in visual inspection and UT measurement should VII F3-7 DRAFT - 1	genefic AMP Program 2/06/99
inspection by conducting plant-wide walkdowns to obtain early detection of significant degradation of system components for endence of any corrosion or other indications of degradation. This inspection should also include ultrasonic thickness masurement at susceptible locations. CLOSED Cooling Water Chemistry	the integrity of all piping and fittings in the ventilation system used to provide air to the primary containment area. (2) Preventive Actions: Periodic plant system walkdowns and visual inspection should be undertaken to assure that the corrosion is not occurring (3) Parameters Monitored/Inspected: The parameters inspected should provide for evidence of any corrosion or other indications of degradation. (4) Detection of Aging Effects: General corrosion, microbiologically influenced corrosion, crevice corrosion, and pitting corrosion may occur in sections of the piping exposed to the warm, moist air within the containment area, particularly in areas such as low spots in the piping. Therefore, inspection of representative components and susceptible locations should be undertaken to provide additional assurance that significant corrosion is not occurring. This inspection should be visual, and ultrasonic thickness measurement at susceptible locations should also be undertaken to assure that significant corrosion is not occurring. (5) Monitoring and Trending: The results of inspections should be used to determine the frequency of any future inspections. (6) Acceptance Criteria: Any degradation form in visual inspection and UT measurement should See ChapterX1 for AM CVALUATION VII F3-7 DRAFT - 1	genefic AMP Program 2/06/99

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# F3. PRIMARY CONTAINMENT HEATING AND VENTILATION SYSTEM Item Structure and Component Region of Interest Environ-Material Aging ment Aging Mechanism References

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#### F3. PRIMARY CONTAINMENT HEATING AND VENTILATION SYSTEM

Existing		Further
Aging Management Program (AMP)	Evaluation and Technical Basis	Evaluation
	<i>(continued from previous page)</i> be reported and evaluated. (7-9) Corrective Actions, Confirmation Process, and Administrative Controls: Site corrective actions programs. QA procedures, site review and approval processes, and administrative controls are implemented in accordance with Appendix B to 10 CFR Part 50 requirements and will continue to be adequate for license renewal. (10) Operating Experience: General corrosion, microbiologically-influenced corrosion, crevice corrosion, and pitting corrosion may occur in sections of the piping exposed to the warm, moist air within the containment area, particularly in areas such as low spots in the piping. In some cases, the humidity level (70%) in the system far exceeded the level recommended in Regulatory Guide 1.52 (See NRC Information Notice IN 82- 49).	

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# GALL REPORT-MECHANICAL DISCIPLINE COMMENTS SECTION VIIF.3

CALL SLETION	TITLE	ITEMNO	PACE	COMMENT
VII F3-1	Aux. Systems ESF Ventilation (Primary Containment Area)	All	VII F3-4 Through 9	Most sections have the statement 'No generic AMP' in the Further Evaluation column. Recommend these sections state 'Plant-specific aging management program/activity' in the Existing Aging Management Program column and 'Plant-specific aging management program/activity required' in the Evaluation and Technical Basis column.
VII F3-4	Aux. Systems ESF Ventilation (Primary Containment Area)	F3.3.1	VII F3-6 and 7	General Corrosion, Crevice Corrosion, Pitting, and MIC are listed as Aging Mechanisms for the interior of Piping. The chemistry program should be the applicable as existing AMP. Refer to AMA titled 'Chemistry Program (Closed Cooling).'
VII F3-5	Aux. Systems ESF Ventilation (Primary Containment Area)	F3.1.3 and F3.1.4	VII F3-6 and 7	For the Elastomer Degradation Aging Mechanism entries, the reference to 'performing a TLAA' is inappropriate. BASIS: A TLAA is an existing calculation or analysis that meets certain specific criteria and that must be dispositioned in one of several acceptable ways for the period of extended operation. Since there is no information presented that suggests the existence of such a calculation, inclusion of any reference to a TLAA in this entry is incorrect and should be removed.

## F4. Diesel Generator Building Ventilation System

F4.1 Duct

- F4.1.1 Duct, Fittings, and Access Doors
- F4.1.2 Equipment Frames and Housing
- F4.1.3 Flexible Collars between Ducts and Fans
- F4.1.4 Seals in Dampers and Doors
- F4.2 Air Handler Heating/Cooling
  - F4.2.1 Heating/Cooling Coils
- F4.3 Piping
  - F4.3.1 Piping and Fittings

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#### F4. Diesel Generator Building Ventilation System

#### System, Structures, and Components

The system, structures, and components included in this table comprise the diesel generator building ventilation system which contain ducts, piping and fitting, equipment frames and housings, flexible collars and seals, and heating and cooling air handlers. Based on US Nuclear Regulatory Commission Regulatory Guide 1.26, "Guality Group Classifications and Standards for Water, Steam, and Radioactive-Waste-Containing Components of Nuclear Power Plants," all components in the diesel generator building ventilation system are classified as Group C Quality Standards.

#### System Interfaces

The system that interface with the diesel generator building system is the auxiliary and radwaste area ventilation system (Table VII F2).

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F	4. DIESEL G	ENERATOR BUI	DING VENTL	LATION 313	A #2	Aring	
Item	Structure and Component	Region of Interest	Material	Environ- ment	Effect	Mechanism	References
F Item F4.1.1 F4.1.2	4. DIESEL G Structure and Component Duct	Region of Interest Duct Fittings. and Access Doors. Equipment Frames and Housing	Material CS (Galvanized or Painted) Bolts: Plated CS	Environ- ment Warm, Moist Air	Aging Effect Loss of Material	Aging Mechanism General, Micro- biologically -Influenced, Pitting, and Crevice Corrosion	References NRC IN 82-43. NRC Reg. Guide 1.52.

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Plant specific aging management program/activity required

VII AUXILIARY SYSTEMS		5
<b>VF4.</b> DIESEL GENERATOR BUI	LDING VENTILATION SYSTEM	
Existing		Further
Aging Management Program (AMP)	Evaluation and Technical Basis	Evaluation
The AMP should rely on routine viguel	(1) Scope of Program. The AMP should focus on managing	Yes, no
inspection by conducting system	the integrity of all ducts, fittings and equipment frames	generic
walkdowns to obtain early detection of	and housings in the ventilation system used to provide air	AMP /
significant degradation of system	to the diesel generator building area. (2) Preventive	}
components, such as ducting, fan	Actions: Periodic plant system walkdowns and visual	
housings, damper frames, heat	inspection should be undertaken to assure that the	
exchanger housing, and other items for	corrosion is not occurring. (3) Parameters Monitored/	/
evidence of any corrosion, wear, or	Inspected: The parameters inspected should include	/
other indications of degradation.	evidence of material loss such as holes, pitting and rust	
	buildup. The moisture level should be examined	
Mant specific.	periodically at susceptible locations of components to	
	ensure acceptable levels of moisture in the air throughout	)
aying management	the system. Additional parameters should include	1
	evidence of tearing of elastomeric flexible collars.	}
program/activity	excessive wear and/or hardness of elastomeric seals on	
	dampers, and loosening of bolts anchoring equipment.	/
	(4) Detection of Aging Effects: General corrosion.	{
	microbiologically-influenced corrosion, crevice	1
	corrosion, and pitting corrosion may occur in sections of	
	the duct exposed to the warm and moist air particularly in	
	areas such as low spots in the duct. Degradation of duct	
	and fittings becomes evident by observation of pitting.	
	rust, degradation of paint and other coatings, and the	/
$\backslash$	appearance of small holes. Additional examination	
	techniques should be considered to detect effects of	
	corrosion especially in areas not easily detected from the	1
	walkdowns. (5) Monitoring and Trending: Certain areas	{
	not easily inspected due to poor access or other	1
	impediments, should be inspected by gaining access	1
	through manway or other access doors. The results of	1
	inspections should be used to determine the frequency of	1
	any future inspections. (6) Acceptance Criteria: Any	1
	appearance of excessive rust, pitting, and buildup of	1
l l	foreign material on the surfaces of the ducts, fittings, and	1
	bolting should be reported and evaluated. Appearances of	
	tearing, excessive wear, or other distress of elestomer	1
$\sim$	flexible collars and/or seals should also be reported and	
	evaluated. (7-9) Corrective Actions, Confirmation	
/ TILLAN	Process, and Administrative Controls: Site corrective	1
	actions programs, QA procedures, site review and approval	\
( ck- ) )	processes, and administrative controls are implemented	)
	in accordance with Appendix B to 10 CFR Part 50	/
	requirements and will continue to be adequate for license	/
	renewal. (10) Operating Experience: General corrosion.	1
Ū I	microbiologically-influenced corrosion, crevice	
	corrosion, and pitting corrosion may occur in sections of	5
	the duct exposed to the warm and moist air particularly in	
$\mathbf{X}$	areas such as low spots in the duct. In some cases, the	1
$\mathbf{X}$	humidity level in the system far exceeded the level (70%)	ļ
λ	recommended in Regulatory Guide 1.52 (See NRC	
	Information Notice IN 82-43).	<u> </u>
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#### F4 DIESEL GENERATOR BUILDING VENTILATION SYSTEM

	r	4. DIESEL G	ENERATOR BUI					
ſ	Ltern	Structure and Component	Region of Interest	Material	Environ- ment	Aging Effect	Aging Mechanism	References
	F4.1.3 F4.1.4	Detelo	Flexible Collars Between Ducts and Fans. Seals in Dampers and Doors	Elastomer (Neoprene)	Warm. Moist Air	Hardening and Loss of Strength	Elastomer Degradation From Heating and Radiation	NRC IN 82-43. NRC Reg. Guide 1.52.
	F4.1.3 F4.1.4	Duct	Flexible Collars Between Ducts and Fans, Seals in Dampers and Doors	Elastomer (Neoprene)	Warm. Moist Air	Attrition	Wear	NRC IN 82-43. NRC Reg. Guide 1.52.
	F4.2.1	Air Handler Heating/ Cooling	Heating/ Cooling Coils	Copper/ Nickel	Warm. Moist Air	Loss of Material	General, Micro- biologically -Influenced, Pitting, and Crevice Corrosion	NRC IN 82-43. NRC Reg. Guide 1.52.
	F4.3.1	Piping	Piping and Fittings	Carbon Steel	Hot or Cold Treated Water	Loss of Material	General, Micro- biologically -Influenced, Pitting, and Crevice Corrosion	NRC IN 82-43. NRC Reg. Guide 1.52.

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#### F4. DIESEL GENERATOR BUILDING VENTILATION SYSTEM



# F4. DIESEL GENERATOR BUILDING VENTILATION SYSTEM

Item	Structure and Component	Region of Interest	Material	Environ- ment	Aging Effect	Aging Mechanism	References
	Component						
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#### AUXILIARY SYSTEMS VП

# F4. DIESEL GENERATOR BUILDING VENTILATION SYSTEM

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Existing		Further
Aging Management Program (AMP)	Evaluation and Technical Basis	Evaluation
	(continued from previous page) inspection and UT measurement should be reported and evaluated. (7-9) Corrective Actions, Confirmation Process, and Administrative Controls: Site corrective actions programs, GA procedures, site review and approval processes, and administrative controls are implemented in accordance with Appendix B to 10 CFR Part 50 requirements and will continue to be adequate for license renewal. (10) Operating Experience: General corrosion, microbiologically-influenced corrosion, crevice corrosion, and pitting corrosion may occur in sections of the piping exposed to the warm and moist air particularly in areas such as low spots in the piping. In some cases, the humidity level in the system far exceeded the level (70%) recommended in Regulatory Guide 1.52 (See NRC Information Notice IN §2-43).	

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# GALL REPORT-MECHANICAL DISCIPLINE COMMENTS SECTION VIIF.4

CALL SECTION	TITLE	ITEM NO.	PACE	COMMENT
VII F4-1	Aux. Systems Dicsel Generator Building Ventilation	All	VII F4-4 Through 9	Most sections have the statement 'No generic AMP' in the Further Evaluation column. Recommend these sections state 'Plant-specific aging management program/activity' in the Existing Aging Management Program column and 'Plant-specific aging management program/activity required' in the Evaluation and Technical Basis column.
VII F4-4	Aux. Systems Diesel Generator Building Ventilation	F4.3.1	VII F4-6 and 7	General Corrosion, Crevice Corrosion, Pitting, and MIC are listed as Aging Mechanisms for the interior of Piping. The chemistry program should be the applicable as existing aging management program.
VII F4-5	Aux. Systems Diesel Generator Building Ventilation	F4.1.3 and F4.1.4	VII F4-6 and 7	For the Elastomer Degradation Aging Mechanism entries, the reference to 'performing a TLAA' is inappropriate. BASIS: A TLAA is an existing calculation or analysis that meets certain specific criteria and that must be dispositioned in one of several acceptable ways for the period of extended operation. Since there is no information presented that suggests the existence of such a calculation, inclusion of any reference to a TLAA in this entry is incorrect and should be removed.

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### G. Fire Protection

- G.1 Intake Structure
  - G.1.1 Fire Barrier Penetration Seals
  - G.1.2 Fire Barrier Walls, Ceiling, and Floors
  - G.1.3 Fire Rated Doors
- G.2 Turbine Building
  - G.2.1 Fire Barrier Penetration Seals
  - G.2.2 Fire Barrier Walls, Ceiling, and Floors
  - G.2.3 Fire Rated Doors
- G.3 Auxiliary Building
  - G.3.1 Fire Barrier Penetration Seals
  - G.3.2 Fire Barrier Walls, Ceiling, and Floors
  - G.3.3 Fire Rated Doors
- G.4 Diesel Generator Building
  - G.4.1 Fire Barrier Penetration Seals
  - G.4.2 Fire Barrier Walls, Ceiling, and Floors
  - G.4.3 Fire Rated Doors
- G.5 Primary Containment
  - G.5.1 Fire Barrier Walls, Ceiling, and Floors
  - G.5.2 Fire Rated Doors
- (G.6 High Pressure Service Water System Water Based Fire Protection System
  - G.6.1 Piping and Fittings
  - G.6.2 Filter, Fire Hydrants, Mulsifier, Pump Casing, Sprinkler, Strainer, and Valve Bodies
  - G.7 Reactor Coolant Pump Oil Collect System

- G.7.1 Tank
- G.7.2 Piping, Tubing, Valve Bodies
- G.8 Diesel Fire System
  - G.8.1 Diesel-Driven Fire Pump and Fuel Supply Line

#### G. Fire Protection

#### System, Structures, and Components

The system, structure, and components included in this table comprise the fire protection system for both boiling water reactors (BWRs) and pressurized water reactors (PWRs) and consist of several Class 1 structures and mechanical systems. The Class 1 structures include intake structure, turbine building, auxiliary building, diesel generator building, and primary containment, and structural components include fire barrier wall, ceiling, floor, fire door, and penetration seal. Mechanical systems include high pressure service water system, reactor coolant pump oil collect system, and diesel fire system, and mechanical components include piping and fittings, filter, fire hydrant, mulsifyer, pump, valves, sprinkler, and strainer. All the mechanical components are classified as Group C Quality Standards.

Pumps and valves are considered to be active components and pump internals and seats, discs, bolting, and other valve items should be covered by the plant maintenance program.

#### System Interfaces

The systems that interface with the fire protection system include various Class 1 structures and component supports (Chapter III), closed cycle cooling water system (Table VII C2) and the Diesel Fuel Oil System (Table VII H1).



	VII A	AUXILIARY SYS	TEMS					
		FIRE PRO	TECTION		Dural and	0	Aring	
A	Them	Structure and	Region of	Material	Environ- ment	Effect	Mechanism	References
$\lor$	-611	Intake	Fire Barrier	Sealant	Indoors:	Increased	Weathering	10 CFR Part 50,
	7	Structure	Penetration		Air	Hardness and	_	Appendix R.
	/		Seals		Outdoors:	Shrinkage		
Å			(for Piping,		Sun.		-	
- /			Electrical		Weather.			
			Conduit,		Humidity.			
Ì			Cable Tray,		Anu Moisture			N
			Ventilation.					
	\		Air Condition,					
		N	and _		NorA	TLAA		
			Expansion		NOT IT.			
			Joint					
1						2		
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1								
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								10 OFR Det 50
	G.1.2	Intake	Fire Barrier	Concrete and	Indoor and	Concrete	rreeze-	Appendix R
		Structure	walls, Ceiling,	ment	Environ-	Spalling	Aggressive	- ppender ic
			and Floors		ments		Chemical	
	1						Attack, and	
	1				1		Reaction	
	1				1		with	
	ł					1	Aggregates	
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#### VII AUXILIARY SYSTEMS G. FIRE PROTECTION

Existing Aging Management Program (AMP) As part of the plant fire protection program mandated by 10 CFR Part 50, Appendix R, the fire barrier inspection program requires periodic visual inspection of fire barrier penetration seals for signs of seal degradation such as cracking, separation from walls or components, rupture or puncture of seal, to ensure that the intended function of the fire barrier penetration is maintained. The inspection should be conducted once every 18 months. Corrective actions should be initiated as necessary. In addition, several properties of sealant change over time due to weathering. Sealants generally harden as they age, making sealing more difficult. If allowed to proceed. some of the changes in the material may result in failure to seal the joint tightly. Therefore, time-limited aging analysis (TLAA) of the sealant should be performed for the period of license renewal,

As part of the plant fire protection program mandated by 10 CFR Part 50, the fire barrier inspection program requires periodic visual inspection of fire barrier walls, ceilings, and floors, for signs of degradation such as concrete cracking, spalling, and corrosion of reinforcement, to ensure that the intended function of the fire barriers is maintained. The inspection should be conducted once every 18 months. Corrective actions are initiated as necessary.

NOTATRAD Further Evaluation and Technical Basis Evaluation (1) Scope of Program: The program is focused on managing Yes the effects of weathering on the intended function of the TLAA penetration seals of piping, electrical conduit, cable tray, heating, ventilation, air condition, and expansion joint that perform fire barrier function. (2) Preventive Actions: Penetration seal provides a fire barrier to confine or retard a fire from spreading by protecting the safetyrelated systems and components from heat and smoke exposure. Periodic inspection is performed. Degraded penetration seal is repaired or replaced. (3) Parameters Monitored Anspected: The visual inspection examines the signs of degradation such as cracking, separation from walls and component, separation of layers of material, rupture and puncture of seal which are directly caused by increased hardness and shrinkage of seal material due to weathering. (4) Detection of Aging Effects: Visual inspection should detect cracking, separation from walls and component, rupture and puncture of seal. Visual inspection and periodic inspection performed at least once every 18 months should ensure timely detection of increased hardness and shrinkage of the penetration seal before the loss of the component intended function. (5) Monitoring and Trending: The effects of weathering are detectable by visual inspection and, based on operating experience, inspection performed at least once every 18 months that degradation of the fire barrier penetration seal is detected prior to loss of the intended function. (6) Acceptance Criteria: No visual indications of cracking. separation from walls and components, or separation of layers of material, or rupture and puncture of seal. However, properties of sealant change over time due to weathering; TLAA of the sealant should be performed to assure continued service. (7-9) Corrective Actions, Confirmation Process, and Administrative Controls: Site corrective actions program, QA procedures, site review and approval process, and administrative controls are implemented in accordance with Appendix B to 10 CFR Part 50 requirements and will continue to be adequate for license renewal. (10) Operating Experience: Operating experience with this AMP has shown that failure of penetration seal due to weathering is insignificant. (1) Scope of Program: The program is focused on managing No the aging effects on the intended function of the fire rated walls, ceilings, and floors that perform fire barrier function. (2) Preventive Actions: Fire rated walls, ceilings, and floors provide fire barriers to confine or retard a fire from spreading by protecting the safetyrelated systems and components from flame and heat exposure. Visual inspection is conducted at least every 18 months. Corrective actions are initiated as necessary. (3) Parameters Monitored/Inspected: The AMP requires visual inspection of the fire rated walls, ceilings, and floors for cracking, spalling, and loss of material which are signs of degradation of the fire rated structural components caused by

C	FIRE PRO	TECTION		Development 1	Arina	Ading	
Item	Structure and	Region of Interest	Material	ment	Effect	Mechanism	References
		-				-	
G.1.2	Intake Structure	Fire Barrier Walls, Ceiling, and Floors	Concrete and Reinforce- ment	Indoor and Outdoor Environ- ments	Loss of Material	Corrosion of Embedded Steel	10 CFR Part 50. Appendix R.
G.1.3	Intake Structure	Fire Rated Doors	Steel	Indoor and Outdoor Environ- ments	Loss of Material	WCAT	Appendix R.

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	G	FIRE PRO	TECTION				Arting	
ſ	Item	Structure and Component	Region of Interest	Material	Environ- ment	Aging Effect	Aging Aechanism	References
							-	
6	$\frown$						$\frown$	
¥	<u>C21</u>	Turbine	Fire Barrier	Sealant	Indoors:	Increased	Weathering	10 CFB Part 50,
	0.2.1	Building	Penetration		Air	Hardness and		Appendix R.
*	,	Dunung	Seals		Outdoors:	Shrinkage		
Λ			(for Piping.		Sun,			
/			Electrical		Weather.			
1			Conduit,		Humidity.			
			Cable Tray.		and			A
$\langle  $			Heating.		Moisture		1101	A
7	$\neg$		Ventilation.				N	pr
			Air Condition,				1	r /
Ī		]	and				$\frown$	
		$\searrow$	Lint					
			Fire Barrier	Concrete and	Indoor and	Concrete	Freeze-	10 CFR Part 50,
	G.2.2	Turbine	Walle Ceiling	Reinforce-	Outdoor	Cracking and	Thaw.	Appendix R.
		Building	and Floors	ment	Environ-	Spalling	Aggressive	
					ments		Chemical	
							Attack, and	
1							Reaction	
							with	
							Aggregates	10 OFP Part 50
	G.2.2	Turbine	Fire Barrier	Concrete and	Indoor and	Loss of	Corrosion	Annendix P
		Building	Walls, Ceiling,	Reinforce-	Outdoor	Material	Embedded	appendix ic
	ł		and Floors	ment	Environ-		Steel	
				ļ	ments	Tana cf	Wear	10 CFR Part 50.
	G.2.3	Turbine	Fire Rated	Steel	Indoor and	Loss of	wear	Appendix R.
		Building	Doors		Outdoor	Material		
					Environe			
l					ments	Ingreased	Weathering	10 CFR Part 50
$\mathbb{N}$	G.3.1	Auxiliary	Fire Barrier	pealant	Air	Hardness and	1	Appendix R.
	1	Building	Penetration		Outdoors	Shrinkage		
`			Seals		Sun			
	17		LIOT Piping,	1	Weather.	1	1	
	1/		Conduit		Humidity.			
	V		Cable Trav	1	and	1		1 TT AA
	Ν		Heating.	1	Moisture		1 NO7 1	4 ICMA
		+	Ventilation.				1	
			Air Condition				1	
			and	ļ	ļ			1 ~~~
			Expansion		1			
	1		Joint)			$1 \ge $	1	
	632	Auxiliary	Fire Barrier	Concrete and	Indoor and	1 Concrete	Freeze-	10 CFR Part 50.
	0.0.2	Building	Walls. Ceiling	, Reinforce-	Outdoor	Cracking an	d Thaw,	Appendix R.
		- Standard	and Floors	ment	Environ-	Spalling	Aggressive	
			· ·		ments		Unemical	
	1				1	1	Attack, an	
			1	1	Į	1	Reaction	
							Addredate	
	1	1	1	1	1	•	Aggregates	P

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FIRE PROTECTION G. Further Existing Evaluation and Technical Basis Evaluation Aging Management Program (AMP) (Continued from previous page) administrative controls are implemented in accordance with Appendix B to 10 CFR Part 50 requirements and will continue to be adequate for license renewal. (10) Operating Experience: Fire doors have experienced wear of the hinges and handles. Operating experience with this AMP has shown that degradation of fire door is insignificant. Same as the effects of Weathering of Item G.1.1 fire barrier Yes Same as the effects of Weathering of penetration seals for piping. electrical conduit, cable tray. TLAA Item G.1.1 fire barrier penetration seals heating, ventilation, air condition, and expansion joint. for piping, electrical conduit. cable trav. heating, ventilation, air condition, and expansion joint. NOT A TRAA Same as for Freeze-thaw, Aggressive Chemical Attack, and No Same as for Freeze-thaw, Aggressive Chemical Attack, and Reaction with Reaction with Aggregates of Item G.1.2 fire barrier walls, ceiling, and floors. Aggregates of Item G.1.2 fire barrier walls, ceiling, and floors. Same as for Freeze-thaw. Aggressive Chemical Attack, and No Same as for Freeze-thaw, Aggressive Reaction with Aggregates of Item G.1.2 fire barrier walls, Chemical Attack, and Reaction with ceiling, and floors. Aggregates of Item G.1.2 fire barrier walls, ceiling, and floors. No Same as for Wear of Item G.1.3 fire barrier doors. Same as for Wear of Item G.1.3 fire barrier doors. Same as the effects of Weathering of Item G.1.1 fire barrier Yes Same as the effects of Weathering of TLAA penetration seals for piping, electrical conduit, cable tray, Item G.1.1 fire barrier penetration seals heating, ventilation, air condition, and expansion joint. for piping, electrical conduit, cable tray, heating, ventilation, air condition, and expansion joint. NOT Same as for Freeze-thaw, Aggressive Chemical Attack, and No Same as for Freeze-thaw, Aggressive Reaction with Aggregates of Item G.1.2 fire barrier walls, Chemical Attack, and Reaction with ceiling, and floors. Aggregates of Item G.1.2 fire barrier walls, ceiling, and floors.

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		E FIRE PRO	TECTION					
	Item	Structure and Component	Region of Interest	Material	Environ- ment	Aging Effect	Aging Mechanism	References
	G.3.2	Auxiliary Building	Fire Barrier Walls, Ceiling, and Floors	Concrete and Reinforce- ment	Indoor and Outdoor Environ- ments	Loss of Material	Corrosion of Embedded Steel	10 CFR Part 50, Appendix R.
E P	G.3.3	Auxiliary Building	Fire Rated Doors	Steel	Indoor and Outdoor Environ- ments	Loss of Material	Wear	10 CFR Part 50, App <del>e</del> ndix R.
	G.4.1	Diesel Generator Building	Fire Barrier Penetration Seals (for Piping, Electrical Conduit, Cable Tray, Heating, Ventilation, Air Condition, and Expansion	Sealant	Indoors: Air Outdoors: Sun, Weather, Humidity, and Moisture	Increased Hardness and Shrinkage	Weathering A TCAA	10 CFR Part 50, Appendix R.
	G.4.2	Diesel Generator Building	Fire Barrier Walls, Ceiling, and Floors	Concrete and Reinforce- ment	Indoor and Outdoor Environ- ments	Concrete Cracking and Spalling	Freeze- Thaw, Aggressive Chemical Attack, and Reaction with Aggregates	10 CFR Part 50, Appendix R.
	G.4.2	Diesel Generator Building	Fire Barrier Walls, Ceiling, and Floors	Concrete and Reinforce- ment	Indoor and Outdoor Environ- ments	Loss of Material	Corrosion of Embedded Steel	10 CFR Part 50, Appendix R.
	G.4.3	Diesel Generator Building	Fire Rat <del>e</del> d Doors	Steel	Indoor and Outdoor Environ- ments	Loss of Material	Wear	10 CFR Part 50, Appendix R.
	G.5.1	Primary Containment	Fire Barrier Walls, Ceiling, and Floors	Concrete and Reinforce- ment	Indoor	Concrete Cracking and Spalling	Aggressive Chemical Attack, and Reaction with Aggregates	10 CFR Part 50, Appendix R.
	G.5.1	Primary Containment	Fire Barrier Walls, Ceiling, and Floors	Concrete and Reinforce- ment	Indoor	Loss of Material	Corrosion of Embedded Steel	10 CFR Part 50, Appendix R.
	G.5.2	Primary Containment	Fire Rated Doors	Steel	Indoor	Loss of Material	Wear	10 CFR Part 50, Appendix R.

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	G.	FIRE PROTECTION		
		Existing		Further
	Aging Mai	nagement Program (AMP)	Evaluation and Technical Basis	Evaluation
	Same as for Chemical At Aggregates o walls, ceiling	Freeze-thaw. Aggressive tack, and Reaction with of Item G.1.2 fire barrier g, and floors.	Same as for Freeze-thaw, Aggressive Chemical Attack, and Reaction with Aggregates of Item G.1.2 fire barrier walls, ceiling, and floors.	NO
THE .	Same as for barrier door	Wear of Item G.1.3 fire s.	Same as for Wear of Item G.1.3 fire barrier doors.	No
i K	Same as the Item G.1.1 fi for piping. e heating, ver expansion j	effects of Weathering of ire barrier penetration seals lectrical conduit, cable tray, utilation, air condition, and oint.	Same as the effects of Weathering of Item G.1.1 fire barrier penetration seals for piping, electrical conduit, cable tray, heating, ventilation, air condition, and expansion joint.	Yes TLAA
		TLA	A	
	Same as for F Chemical Atta Aggregates oj walls, ceiling	Freeze-thaw, Aggressive tack, and Reaction with of Item G.1.2 fire barrier g, and floors.	Same as for Freeze-thaw, Aggressive Chemical Attack, and Reaction with Aggregates of Item G.1.2 fire barrier walls, ceiling, and floors.	NO
	Same as for Chemical At Aggregates of walls ceilin	Freeze-thaw, Aggressive tack, and Reaction with of Item G.1.2 fire barrier a, and floors.	Same as for Freeze-thaw, Aggressive Chemical Attack, and Reaction with Aggregates of Item G.1.2 fire barrier walls, ceiling, and floors.	No
	Same as for barrier door	Wear of Item G.1.3 fire s.	Same as for Wear of Item G.1.3 fire barrier doors.	No
	Same as for Chemical At Aggregates walls, ceilin	Freeze-thaw, Aggressive tack, and Reaction with of Item G.1.2 fire barrier g, and floors.	Same as for Freeze-thaw, Aggressive Chemical Attack, and Reaction with Aggregates of Item G.1.2 fire barrier walls, ceiling, and floors.	No
	Same as for Chemical At Aggregates walls, ceilin	Freeze-thaw, Aggressive ttack, and Reaction with of Item G.1.2 fire barrier g, and floors.	Same as for Freeze-thaw, Aggressive Chemical Attack, and Reaction with Aggregates of Item G.1.2 fire barrier walls, ceiling. and floors.	No
	Same as for barrier door	Wear of Item G.1.3 fire rs.	Same as for Wear of Item G.1.3 fire barrier doors.	No

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·		TECTION			<b>r</b>		
Item	Structure and	Region of	Material	Environ-	Aging Effect	Aging	References
G.6.1 /	Mich Pressure	Pining and	Carbon Steel	Raw Water	Loss of	General	IN 94-03
/	Service Water	Fittings	(CS),	A NATE FOR CLUI	Material	Microbiolo	
(	System	Ū	Cast Iron.			gically-	
7	Water	Λ	and			Induced.	
/	Basad		Stainless			Pitting, and	
/	Duran a		Sleel (SS)			Crevice	
	MA	1				Corrosion	
	Protection	/					
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	$\Lambda \mathcal{N}$						
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	$\wedge \vee$	$\setminus$					
G.6.1	High Bressure	Piping and	<u>cs</u>	Raw Water	Loss of	Galvanic	IN 94-03.
0.0.1	Service Water	Fittings	Cast Iron, SS		Material	Corrosion	
	System-						
	water						
	Based,						
/	Fire Protect	ion					
	Ciclona						
	SYSTEMI						
	9	$\Delta$					
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See Chapter N for an evaluation Cot Fine Water System Aging Management Activities

VII AUXILIARY SYSTEMS G. FIRE PROTECTION

G FIRE PROTECTION	1			
Existing			Further	
Aging Management Program (AMP)		Evaluation and Technical Basis	Evaluation	$\sim$
Volumetric examination such as-	12	Ane of Program: The program focuses on managing	No	-
ultrasonic testing is conducted eveny 5	loce	of material due to correction on the correct and		]
to 10 years at the most suscentible	033	tion steel components exposed to musimitar	1	1
locations of starpart or law flow	Cas (0)	f from steel components exposed to raw water.		
iocations, e.g., stagnant of low now	(2)	reventive Actions: volumetric examination is		
areas, to examine whether loss of	con	ducted at the most susceptible locations for the		1
material due to corrosion has occurred.	evic	lence of loss of material due to corrosion. Repair and		
Repair or replacement is initiated if loss	repi	acement of the component is initiated as necessary.		
of material exceeds the acceptance	(3) 1	Parameters Monitored/Inspected: Loss of Material		
C <del>riteria</del>	wou	Id reduce component wall thickness. The parameter	-	
	mor	nitored in the AMP is the reduction of wall thickness at	[	
Fire A later System	the	most susceptible locations such as stagnant or low	1	
1112000101 - 10:000	fluic	flow region. (4) Detection of Aging Diffects:		
langer	Ultr	asonic thickness measurement is an effective method		
program	to e	nsure that the effects of corrosion have not occurred		
	and	the component intended function is maintained.		
	(5) 1	fonitoring and Trending: The inspection period is		
	usu	ally between five to ten years considering the slow		
	Droc	ess of corrosion and operating experience. The results		
	ofir	spection are used to dictate the frequency of future		
	inen	estion (6) Accontance with requerky of future		
	+b:0	could acceptance of the minimum measured wall		
	thic.	kness should exceed the minimum required wall		
	unic.	kness at all inspection locations. (7-9) Corrective		
	ACTI	ons, Confirmation Process, and Administrative		
	Соп	trols: Site corrective actions program, QA procedures,		
	site	review and approval process, and administrative		
	cont	rols are implemented in accordance with Appendix B		
	to 10	0 CFR Part/50 requirements and will continue to be		
	adeq	uate for prenewal. (10) Operating Experience:		
	No s	significant corrosion-related problem is reported for		
	the l	high-pressure service water system. Inspection of the		
	com	ponents with 20 years of service has shown minimal		
	or n	o loss of material at all of the sensitive locations. No		
	rena	its or replacements have been initiated based on the		
	inst	ection results NRC performed service water system		
		ational performance inspection and the results are		
		addital performation Notice 04.02		
	6136	issee in mornauon nouce 94-05.		
ri wandown visual inspection and a	μ <del>s</del>	cope of Program. The program should focus on	Yes,	
one-time volumetric examination such	man	aging loss of material due to galvanic corrosion on	no generic	
as ultrasonic testing should be	the c	arbon steel component contacting with the stainless	AMP	
conducted before the license renewal	steel	component. (2) Preventive Actions: Volumetric test,		
application for a carbon steel stainless	such	as ultrasonic testing, should be used to determine	\/	
steel couplings (i. e. locations where	whet	ther significant loss of material due to galvanic	N N	
carbon steel contacts with stainless	corre	osion has occurred. Repair and replacement should be		
steel) located at the most susceptible	initia	ted as necessary (3) Parameters		
locations (e.g., stagnant or-		A		
		-9	f	
			1	
		- Cl' Managent		
Mant-Specific		Plant Specific baing Warageman	1	
		I I WILL THE THE THE THE	/	
Aging Manag Oment		A lith Indram realized	/	
K KJ. K. / N.		אכזייזק און אייזידא		
Activities/ rograms			/	
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		$\neg$		

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Item	Structure and Component	Region of Interest	Material	Environ- ment	Aging Effect	Aging Mechanism	References
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ł						1	
							<b>D104 00</b>
G.6.1	High Pressure Service Water	Piping and Fittings	CS, Cast Iron, SS	Raw Water	Buildup of Deposit	Biofouling	IN 94-03.
G.6.1	High Pressure Service Water System	Piping and Fittings	CS, Cast Iron, SS	Raw Water	Buildup of Deposit	Biofouling	IN 94-03.
G.6.1	High Pressure Service Water System	Piping and Fittings	CS, Cast Iron, SS	Raw Water	Buildup of Deposit	Biofouling	IN 94-03.
G.6.1	High Pressure Service Water System	Piping and Fittings	CS, Cast Iron, SS	Raw Water	Buildup of Deposit	Biofouling	IN 94-03.
G.6.1	High Pressure Service Water System	Piping and Fittings	CS, Cast Iron, SS	Raw Water	Buildup of Deposit	Biofouling	IN 94-03.
G.6.1	High Pressure Service Water System	Piping and Fittings	CS, Cast Iron, SS	Raw Water	Buildup of Deposit	Biofouling	IN 94-03.
G.6.1	High Pressure Service Water System	Piping and Fittings	CS, Cast Iron, SS	Raw Water	Buildup of Deposit	Biofouling	IN 94-03.
G.6.1	High Pressure Service Water System	Piping and Fittings	CS, Cast Iron, SS	Raw Water	Buildup of Deposit	Biofouling	IN 94-03.
G.6.1	High Pressure Service Water System	Piping and Fittings	CS, Cast Iron, SS	Raw Water	Buildup of Deposit	Biofouling	IN 94-03.
G.6.1	High Pressure Service Water System	Piping and Fittings	CS. Cast Iron. SS	Raw Water	Buildup of Deposit	Biofouling	IN 94-03.
G.6.1	High Pressure Service Water System	Piping and Fittings	CS, Cast Iron, SS	Raw Water	Buildup of Deposit	Biofouling	IN 94-03.
G.6.1	High Pressure Service Water System	Piping and Fittings	CS, Cast Iron, SS	Raw Water	Buildup of Deposit	Biofouling	IN 94-03.
G.6.1	High Pressure Service Water System	Piping and Fittings	CS, Cast Iron, SS	Raw Water	Buildup of Deposit	Biofouling	IN 94-03.
G.6.1	High Pressure Service Water System	Piping and Fittings	CS, Cast Iron, SS	Raw Water	Buildup of Deposit	Biofouling	IN 94-03.
G.6.1	High Pressure Service Water System	Piping and Fittings	CS. Cast Iron. SS	Raw Water	Buildup of Deposit	Biofouling	IN 94-03.
G.6.1	High Pressure Service Water System	Piping and Fittings	CS, Cast Iron, SS	Raw Water	Buildup of Deposit	Biofouling	IN 94-03.
G.6.1	High Pressure Service Water System	Piping and Fittings	CS. Cast Iron. SS	Raw Water	Buildup of Deposit	Biofouling	IN 94-03.

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G. FIRE PROTECTION		
Existing		Further
Aging Management Program (AMP)	Evaluation and Technical Basis	Evaluation
(continued from previous page)	(continued from previous page)	
low flow areas) to examine whether loss	Monitored/Inspected The AMP should utilize volumetric	
of material due to galvanic corrosion	examination such as ultrasonic testing to detect reduction	
has occurred. An engineering analysis	of wall thickness at the worst locations such as carbon	
should be conducted if unacceptable loss	steel-stainless steel coupling located at stagnant or low	
of material due to galvanic corrosion is	fluid flow regions or the lower portion of the system.	
found Corrective actions should be	(4) Detection of Aging Effects: Ultrasonic testing is an	
initiated if necessary	effective method to detect loss of material to ensure that	
aparticular sources	the intended function of the component is maintained	
	(5) Monitoring and Transfing: One time inspection should	
	be conducted before the license receival application. If	
	be conducted before the incense reviewar application. In	
	results of increation and component analysis should be	
	used to dictote the frequency of future increation	
× 5	(6) Acceptance Criteria: No unacceptable indication of loss	
	of material due to galania correction (7.9) Correcting	
	Actions Conformation Process and Administration	
	Controle: Site corrective actions program OA procedures	
1 $1$ $4$	controls. She currective actions program, gA procedures,	
	she review and approval process, and administrative	
	to 10 CFP Part 50 requirements and will continue to be	
	adequate for license reneral (10) Operating Experience:	
	No significant problem due to loss of material by galvania	
	correston has been reported for the high-pressure service	
	water system NPC performed a service water system	
	water system. Trice performance inspection and the results are	
	discussed in Information Netice 94-09	
		N
Buch test are conducted to ensure no	(1) Scope of Program: The program locuses on managing	NO
fouling has accurred in the motor	unter (2) Proventive Actions: Periodia full flow fluch text	
Corrective actions such as cleaning are	water. (2) Fredentide Actions: Periodic Iuli now hush test	
initiated if passagery	the component (2) Recompton Manitered (Increated) The	
indiated in necessary.	AMP monitors the performance by full flow and getern	
	AMP monitors the performance by full now and system	
	describe the system performance (d) Detection of Arian	
	Degrade the system performance. (4) Detection of Agong	
	Effects: Periodic system periormance test and hush test	
	are elective methods to ensure that the elects of fouring	
	maye not occurred and the intended functions are	
	manifameta. (3) monitoring and Irenaing: Penoalc	
	system periormance and run now hush tests should	
	data (6) Accentance Criteria: No indications of huildun of	
	densit in the component (7.0) Corrective Actions	
	Confirmation Droppes and Administrative Controls,	
	corrective actions program OA procedures site review and	
	annoval process and administrative controls are	
	implemented in accordance with Annendix R to 10 CFP	
	Part 50 requirements and will continue to be adequate for	
	license renewal (10) Operating Evanience: Full flow	
	nerformance test has resulted in cleaning of enrindler	
	hade NRC performed a service water system operational	
	neads. The perior and the results are discussed in	
	Information Notice 94-03: applicants should review this	
	information for applicability to their facilities and	
	consider actions as appropriate	
·	consider actions as appropriate.	

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Item	Structure and Component	Region of Interest	Material	Environ- ment	Aging Effect	Aging Mechanism	References
G.6.2	High Pressure Service Water System	Filter, Fire Hydrant, Mulsifyer, Pump Casing, Sprinkler, Strainer, and Valve Bodies	CS. Cast Iron, Bronze, Copper, SS	Raw Water	Loss of Material	General, Microbiolo gically- Induced, Pitting, and Crevice Corrosion	IN 94-03.
G.6.2	High Pressure Service Water System	Filter, Fire Hydrant, Mulsifyer, Pump Casing, Sprinkler, Strainer, and Valve Bodies	CS Cast Iron	Raw Water	Loss of Material	Galvanic Corrosion	IN 94-03.
G.6.2	High Pressure Service Water System	Filter, Fire Hydrant, Mulsifyer, Pump Casing, Sprinkler, Strainer, and Valve Bodies	CS, Cast Iron, Bronze, SS	Raw Water	Buildup of Deposit	Biofouling	IN 94-03.
G.7.1	Reactor Coolant Pump Oil Collect System	Tank	CS	Lubricating Oil	Loss of Material	General. Galvanic, Pitting. and Crevice Corrosion	10 CFR Part 50, Appendix R. IN 94-58.
G.7.2	Reactor Coolant Pump Oil Collect System	Piping, Tubing, Valve Bodies	Piping and Valve Bodies: CS; Tubing: Copper, Brass	Lubricating Oil	Loss of Material	General, Galvanic, Pitting, and Crevice Corrosion	10 CFR Part 50, Appendix R.

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G. FIRE PROTECTION

Parte Maria		
Aging Management Program (AMP)	Evaluation and Technical Basis	Further
Same as the effect of General, Microbiologically-Induced, Pitting, and Crevice Corrosion on Item G.6.1 high- pressure service water system piping and fittings.	Same as the effect of General, Microbiologically-Induced, Pitting, and Crevice Corrosion on Item G.6.1 high-pressure service water system piping and fittings.	No
Same as the effect of Galvanic	Same as the affact of Caluania Compaign on Itom C. 6.1	- Vee
Corrosion on Item G.6.1 high-pressure service water system piping and fittings.	high-pressure service water system piping and fittings.	generic AMP
Same as the effect of Biofouling on Item G.6.1 high-pressure service water system piping and fittings.	Same as the effect of Biofouling on Item G.6.1 high- pressure service water system piping and fittings.	No
As part of the plant fire protection program mandated by 10 CFR Part 50. Appendix R. a one-time visual inspection and volumetric examination should be conducted of the lower portion of a sample component with the potential to be exposed to oil and water. Engineering analysis should be carried out to determine the proper corrective actions if the measured wall thickness is below the acceptance criteria.	<ul> <li>(1) Scope of Program: The program should utilize visual and volumetric examinations to manage loss of material due to corrosion on the intended function of the system.</li> <li>(2) Preventive Actions: Verification of the structural integrity by timely inspection and corrective actions prevent corrosion of the component. (3) Parameters Monitored/Inspected: Loss of Material would reduce component wall thickness. The AMP should monitor the wall thickness of the lower portion of the component where contaminant water is expected to accumulate.</li> <li>(4) Detection of Aging Effects: Aging degradation of the component example the form of loss of material before the loss of the intended function of the component.</li> <li>(5) Monitoring and Trending: Visual inspection and volumetric inspection should be used to ensure that the effects of corrosion have not occurred and intended functions of the component are maintained.</li> <li>(6) Acceptance Criteria: The measured wall thickness should exceed the required minimum wall thickness should exceed the required minimum wall thickness should exceed the required minimum wall thickness stermined by engineering analysis. (7-9) Corrective Actions, Confirmation Process, and Administrative controls are implemented in accordance with Appendix B to 10 CFR Part 50 requirements and will continue to be adequate for license renewal. (10) Operating Experience: No significant corrosion-related problem has been reported for this component. IN 94-58. "Reactor Coolant Pump Lube Oil Fire" reported that a crack in a 1 inch diameter PVC coupling in the pump oil lube system caused oil leak and subsequent fire.</li> </ul>	Yes, no generic AMP
and Crevice Corrosion of Item G.7.1 reactor coolant pump oil collect tank.	Corrosion of Item G.7.1 reactor coolant pump oil collect tank,	no generic AMP

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	Structure and	Region of	Matanial	Environ-	Aging	Aging Mechanism	References
Item	Component	Interest	Material	ment	Effect	MCCHAINSIN	10.000 0-4 50
G.8.1	Diesel Fire	Diesel-Driven	CS	Fuel Oil	Loss of	General,	TO CFR Part 50.
	System	Fire Pump and			Material	Galvanic.	Appendix R.
		Fuel Oil				Pitting, and	
1		Supply Line				Crevice	
1		Ouppiy bill				Corrosion	
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G. FIRE PROTECTION

Existing	Further and Tech-leal Resid	Further
Aging Management Program (AMP)	Evaluation and Technical Basis	Evaluation
As part of the plant fire protection	(1) Scope of Program: The program is focused on	No
program required by 10 CFR Part 50,	managing the effects of general corrosion on the intended	
Appendix R, the diesel-driven fire pump	function of the diesel fire pump. (2) Preventive Actions:	
is periodically tested to ensure that the	Periodic testing, such as flow and discharge test,	
fire pump can perform the intended	sequential starting capability test, and controller	
function. Corrective actions are	function test are performed on diesel fire pump to ensure	
initiated as necessary.	that the system can perform the intended function.	
	(3) Parameters Monitored/Inspected: The diesel fire pump	
· · · · · · · · · · · · · · · · · · ·	is under observation during the performance tests for	
	detecting any degradation of the fuel supply line.	
	(4) Detection of Aging Effects: The periodic performance	
-	tests should detect degradation in the fuel oil supply lines	
	before a loss of the intended function can occur.	
	(5) Monitoring and Trending: The performance of fire	
	pump is monitored during the periodic tests to detect any	
	degradation in the system. Periodic tests provide data for	
	trending. (6) Acceptance Criteria: No corrosion is allowed	
	in the fuel supply line. (7-9) Corrective Actions,	
	Confirmation Process, and Administrative Controls: Site	
	corrective actions program, QA procedures, site review and	
	approval process, and administrative controls are	
	implemented in accordance with Appendix B to 10 CFR	
	Part 50 requirements and will continue to be adequate for	
	license renewal. (10) Operating Experience: No corrosion-	
	related problem has been reported for the component.	

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### GALL REPORT-MECHANICAL DISCIPLINE COMMENTS SECTION VIIG

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CALL SECTION	TITLE	ITEM NO	PACE	CONDENT
VII G-1	Fire Protection	Table of Contents	VIIG-1 VII G-12	Change title of Subsection VIIG.6 to "Water Based Fire Protection System" BASIS: The reference to High Pressure Service Water system in the tables, Table of Contents, and description page should be deleted. The High Pressure Service Water System is not necessarily a Fire Protection system.
VII G-2	Fire Protection	G.1.1	VII G-4	Fire Barrier Seals are not Time Limited Aging Analyses. BASIS: Penetration seals do not meet the criteria of a TLAA, specifically the criterion that sates "Involve time-limited assumptions defined by the current operating term, for example, 40 years."
VII G-3	Fire Protection	G.6.1	VII G-12	Item G.6.1 has the statement 'No generic AMP' in the Further Evaluation column. Recommend this section state 'Plant-specific aging management program/activity' in the Existing Aging Management Program column and 'Plant-specific aging management program/activity required' in the Evaluation and Technical Basis column.
VII G-4	Fire Protection	G.6.1 for loss of material aging effect	VIIG-13	The volumetric exam discussed on page VII G-13 in the Existing Aging Management Program column is not relevant to the referenced program. BASIS: This appears to be a discussion of Flow Accelerated Corrosion aging management. Replace existing text with "Fire Water System Program" Also, replace the "Evaluation and Technical Basis" information with "See Chapter XI for an evaluation of Fire Water System Aging Management Activities."

### H1. Diesel Fuel Oil System

- H1.1 Piping
  - H1.1.1 Aboveground Pipe and Fittings
  - H1.1.2 Underground Pipe and Fittings
- H1.2 Valves
  - H1.2.1 Body and Bonnet
  - H1.2.2 Closure Bolting
- H1.3 Pump
  - H1.3.1 Casing
  - H1.3.2 Closure Bolting
- H1.4 Tank
  - H1.4.1 Tank Internal Surfaces
  - H1.4.2 Tank External Surfaces
  - H1.4.3 Caulking and Sealant

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#### H1. Diesel Fuel Oil System

#### System, Structures, and Components

The system, structures, and components included in this table comprise the diesel fuel oil system and consist of above ground and underground piping, valves, pump, and tank. Based on US Nuclear Regulatory Commission Regulatory Guide 1.26, "Quality Group Classifications and Standards for Water, Steam, and Radioactive-Waste-Containing Components of Nuclear Power Plants," all components in the diesel fuel oil system are classified as Group C Quality Standards.

#### System Interfaces

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The system that interfaces with the diesel fuel oil system is the emergency diesel generator system (Table VII H2).

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Item	Structure and Component	Region of Interest	Material	Environ- ment	Aging Effect	Aging Mechanism	References
H1.1.1	Piping	Aboveground Piping and Fittings	Carbon Steel	Sun, Weather, Humidity and Moisture	Loss of Material	General Gorresion, Goeting, Degradation VII H-1	Operating Experience GL 98-04
H1.1.1	Piping	Aboveground Piping and Fittings	Carbon Steel	Sun, Weather, Humidity and Moisture	Local Loss of Material	Pitting Corrosion and Crevice Corrosion, Coating, Degradation	Operating Experience GL 98-04
H1.1.2	Piping	Underground Piping and Fittings	Carbon Steel	Soil	Loss of Material	General Corrosion, Galvanic Corrosion and Micro- biologically -Influenced Corrosion	Plant Technical Specifications.

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VI       AIXILIARY SYSTEMS       Monormal and Technell Basis       Further         Aging Management Program (MP)       Evaluation and Technell Basis       Further         Aging Management Program (MP)       Evaluation and Technell Basis       Further         Procedures. The plant system       (J) Scope of Program: The program should focus on the indid focus on the indid focus on the components (20 Presention on the indid focus on the indid focus on the components (20 Presention on the indid focus on the components (20 Presention on the indid focus on the indid focus on the components (20 Presention on the indid focus on the indices of the component base on course indicates of the component base on course indicates of the course on the procedures (4) Further to counting is that the san course on the indicates of the course on the indicates on the course on the indicates on the course on the indicates of the course on the indicates on the course on the indicates on the indicates on the indicates on the indicates on the course on the indicates on the inditeness on the indicates on the indicates on the indicate				
VI       ATXILIARY SYSTEMS       Purther         Existing       Existing       Further         Reg Management Program (AMP)       Evaluation and Technical Basis       Further         Combination of plant system       Basis Component (2017)       Evaluation on the intended function of the component (2017)         Wilkdowns and mainterpance       Combination of plant system       Continue and store activation of the component (2017)       Evaluation of the sufficient of the component. (2017)         Walkdowns and mainterpance       The component form environmental exposule. (3) Preventive and the component (2018)       AMP         Walkdown suddle and the QA       Some endition of plant system       Some endition of and the component. (2017)       AMP         Noncored number and store endities of the component (2017)       Some endities of the component (2017)       Some endities of the component (2017)       AMP         Noncored number and the QA       Corrective actions stolution of plant system withdown during endities of the correst and intended functions are maintained. (2016)       Some endities of the correst correst and intended functions are maintained. (2016)       Some endities of the correst and intended functions and should cortinue to be adequate for humaly system withdown during end notable proved for timely detection of aging differst of corrosts are detended and should require introded functions and should continue to be adequate for humaly system withdown during end notable proved for timely detection of aging dinterst (2017)       Some end for Operating Expo		T I I I I I I I I I I I I I I I I I I I	i dan racation queling	
VII       AUXILIANT SYSTEMS       Further         HI.       DISSELFUEL OIL SYSTEM       Further         Aging Management Program (AMP)       Evaluation and Technical Basis       Further         The AMP should consist of A       managing the effects of general correction on the hitmedian on the intended functions: Faint or coating should focus on the intender of the component. Plant walkdowns should consist of A       MP         You all inspection the degradation and the intender of the component. Plant walkdowns results.       MP       MP         Walkdown and mainterprinter a restward walkdown results.       Monitorefunce on counting should prevent or mitigate corrosin on the intender on counting inspection. The AMP should utilize plant mainter a restward walkdown at the plant mainter a restward walkdown at the call or coating is inspecting and coordinant plant the plant or coating inspecting and coordinant plant the plant or coating inspecting and construction of plant system walkdown during each outcage provide for timely detection of aging effects. (b) Acceptance Criteria Ary seating addition should require the divide or coating is inspecting and intended functions are maintained. (b) Monitoring and Trending: The effects of corrosion are detable by visual techniques and, based on operating experiment Coating is thread walkdown during each outcage provide for timely detection of aging effects. (c) Acceptance Criteria Ary seating the divide maintstrative controls should be implemented in accordance with Appendix B to 10 CFR Eart S0 requirements and should continue to be adequate for theses renewal. (10) Operating Experiment Coating is thread walkdown during each outcage proved is the according and shouid require thread walkdown during each outcage provide		me	tal orgeach let	
Int       Disself yuzi, on Arstring         Existing       Evaluation and Technical Basis       Further         The AMP should consist of A       (J) Scope of Program: The program should focus on       Yes.         managing the effects of general corroction on the intended function of plant system       (J) Scope of Program: The program should focus on       Yes.         managing the effects of general corroction on the intended function of the component. Plant maintegance procedures for paint general corroction on the intended function of the component. Plant maintegance procedures for paint general corroction on the intended function of the component is non motor sector floated on the corroction of the intended function of a ging general corroction on the intended function of a ging general corroction on the intended function of a ging general corroction on the intended function of a ging general corroction on the intended function are monitor sector for ging general corroction on the intended function of general general corroction on the intended function are monitor sector for general general corroction on the intended function are monitor sector for general general corroction on the intended function of general corroction are detectable by visual configuration for the component has not occurred and intended in the the paint or calling in the the paint or calling in the control is should be initiated as a general corroction general corroction on the intended for timely degradation for paint or calling in the control is should be initiated as a for General Corroction of Item Million of general forces, and Administrative Controls Should require for the control is should be intined for the component has not occurred and information society of general corroction of Item Milling are protected in stonal performating an		VII AUXILIARY SYSTEMS	duringtage ment	
Existing       Evaluation and Technical Basis       Further         Print MAP       Evaluation and Technical Basis       Further         Some name       (1) Scope of Program: The program should focus on the interface procedures. The plant system manging the effects of general correction on the interface of the component. (2) Preventive Actions: Plant withdown should a require train or coaling should prevent on miligate Actions: Plant withdown in the plant maintedance procedures is print.       (1) Scope of Program: The program should focus on the interface of the component. (2) Preventive Actions: Plant withdown is found the component. (3) Preventive Actions: Plant withdown is found the component. (4) Preventive Actions: Plant withdown is nonitor execting the graduation of the component is possible withdown in the plant mainted ance procedures should require a review and procedures should require a review and effective actions and the QA proceedures and the QA proceedures and the QA proceedures are maintened. (5) Acounted and intended function of plant or coaling inspecting and and continue that effects of corrosion on external surfaces of the component has not occurred and intended function of aging effects. (6) Acooptance Criteria: Any example and should continue to be adequate for landshould require that effects (6) Acooptances. Standard lenguing the sately related yread and approval process, and administrative controls. Standard Provestion on the sately related yreads and should continue to be adequate for practice. Just and should continue to be adequate for the sately related yreads and should continue to be adequate for heast renewal. (10) Operating Experiment: Coaling degradation should be intered function of underground piping and fittings.         Same as for General Corrosion of Item M11.1.1 Aboveground piping and fittings are protected pre		HI. DIESEL FUEL OIL SYSTEM	a (CO - C	
being Management Program (AMP)       Evaluation and Technikal Basis       Evaluation         The AMP should consist of A combination of plant system willdowns and mainterface procedures. The plant system variance different during the effects of general corrotion on the intended function of the component. (2) Presentive Actions: Plant warkdowns should focus on managing the effects of general corrotion on the intended function of the component. (2) Presentive Actions: Plant warkdowns should proceedures of the component from environmential exposite. (3) Perameters MonitorealInspected: The AMP should utilize plant anticipance procedures is private walkdowns to monitor essentigilegradation which is a coaling and the QA procedure school require a review and evaluation of the walkdown findings. Corrective actions should be initiated as a factor action site surfaces of the component has not occurred and interest for corrosin or a detectable by visual techniques and, based on operating experience. plant system walkdown for a diministrative controls should be imported and should continue to be adequate for linely detection of a ging effects. (6) Acceptance Crieria: Any setting equations hould be imported and should be reported and should be reported and should be imported and should be imported and should be imported and should be imported. Since oursel and should controls should be imported and should be protective. Since oursel in the safety related system walkdown and ministrative controls should be imported and should controls. Since oursel and should controls is found to make the second piping and fittings.       Yes.         Model ourself ourself of the deself held of underground piping.       (J) Scope of Program: The program relies on preventive measures such as coating, and structures field ourself or the suitable means may be used to monitor the condition of underground piping is coated with pr	ſ	Existing		Further
The AMP should consist of A       [1] Scope of Program: The program should focus on managing the effects of general corrols on the intended unction of the component. Plant walkdowns should corre entire surface of the component. (2) Preventive AMP       Yes, more plant system         walkdown guidelines should require visual inspection for degraded particle and reporting the walkdown results. When executing degradation is found, the plant maintedance procedures for particle and procedures, should require a review and procedures, should require a review and necessary.       Yes, and procedures are of the component from environmental exposure. (3) Parameters instituted and the QA procedures should require a review and exclusion of plant generation of Aging Effects: Degradation of materials: (4) Detection of Aging Effects: Degradation of external surfaces of the component has not occurred and intended functions are maintainde. (5) Monitoring and intended functions are maintainde. (5) Monitoring site corrective actions program. Class proceedings, and administrative controls should require urber evaluation. (7-9) Corrective Actions, Confirmation Process, and Administrative controls should require to algoing defects. (6) Accoptance Criteria any existing degradation should be intrusted approval process, and administrative controls should require to the safety for the advection of generic corrosion of time Millings are protected per standard industry practice, with external costing of Jitems.       Yes, Some as for General Corrosion of Jitem M1.1.1 Aboveground piping and fittings.       Yes, Some os for General Corrosion of Jitem M1.1.1 Aboveground piping and fittings.       Yes, Some os for General Corrosion of Jitem M1.1.1 Aboveground piping and fittings.       Yes, Some os for General Corrosion of Jitem M1.1.1 Aboveground piping and fittings.       Yes, Some os for General Corrosion of Jite		Aging Management Program (AMP)	Evaluation and Technical Basis	Evaluation
Combination of plant system       managing the effects of general corrolon on the Intended function of the component. Year walkdowns should creating should require visual inspection of Aging Actions: Faint or coating should prevent or mitigate corrosion by protecting the walkdown results.       AMP         When excelling degradation is found, their ad protective actions should be initiated as procedures for paint or coating inspecting in the walkdown results.       Bit is the plant maintegance procedures for paint or coating inspecting and action of the component. Year Prevent or mitigate corrosion by protecting the walkdown function action action of aging Effects. Segnadation of the expectation of Aging Effects: Degradation of the expectation of paint or coating inspecting and confirming that the paint or coating is intact is an effective method to ensure that effects of corrosion on court without degradation. (f) Morinaria and the extend surfaces of the component has not occurred and intended functions are maintained. (g) Morinaria and the extend surfaces of the component has not occurred and intended functions are maintained. (g) Morinaria and the extend surfaces of the method to ensure that effects of corrosion are detectable by visual techniques and, based on operating experience, plant walkdown and process, and administrative controls should be produred and should be reproved and should be reproved and should be reproved and should be reproved and should be proved and should be proved and should be proved and should be plant and action and administrative controls should be produred.         Same as for General Corrosion of Item H11.1.1 Aboveground piping and fittings.       Same as for General Corrosion of Item H11.1.1 Aboveground piping and fittings.       Yes.         The external surfaces of the diesel fuel outer groups and structure for the surface s		The AMP should consist of a	(1) Scope of Program: The program should focus on	Yes,
walkdowns and mainter/nce procedures. The plant system walkdown guidelines should require visual inspection for degended paint before during and streach outge, and reporting the walkdown results.       AMP         When examing degradation is found, the plant mainterfance procedures for paint evaluation of the walkdown fundings.       Control of the component. (20) Preventive derives of the component is previous and intervention of the state of the component. (20) Preventive and procedures (should require a review and evaluation of the walkdown fundings.       AMP         procedures (should require a review and evaluation of the walkdown fundings.       Control of the component. Plant walkdown with the acterior carbon steel surfaces cannot occur without degradation of paint or coating is inspecting and confirming that the paint or coating is inspecting and confirming that the paint or coating is inspecting and confirming that the paint or coating is inspecting and intended functions are maintained. (3) Monitoring and Trending: The effects of corrosion on eternal surfaces of the component (30) Monitoring and Trending: The effects of corrosion are detectable by visual techniques and, based on operating experience, plant eystem walkdown during each outage provide and should continus to be adequate for Themse renewal. (10) Operating Experience. Coating degradation, such as flaking and peeling, has occurred in the asfety related systems and should continue to be adequate for Themse renewal. (10) Operating Experience. Coating degradation, such as flaking and structures. UNRC Information Notice 98-08-03-       Yes, The external surfaces of the diesel fuel oil underground piping and fittings are protected, per statading and wapping and a cathodic protection system. Other suitable means may be used to monitor the condition of underground piping.       Yes, The external surfaces of the c		combination of plant system	managing the effects of general corrosion on the intended	no generic
procedures. The plant system       work entire surface of the component. (2) Prementive         walkdown guidelines should require       sover entire surface of the component. (2) Prementive         walkdown guidelines should penetric       corrosion by protecting the walkdown results.         When sociated figradation is found, their state should penetric action state state scale of the component. (2) Prementive actions should be initiated as procedures for paint or coating. Inspecting and characteris should require a review and evaluation/of the walkdown findings.         Corrective actions should be initiated as necessary.       metrals." (4) Detection of Aging Effects: Degradation of the external surfaces of the component has not occurred and intended functions are maintained. (3) Monitoring and Trending: The effects of corrosion are detectable by visual techniques and should be reprinted to nearse that effects of corrosion are detectable by visual techniques and should continue to be adequate for bense renewal. (10) Operating Experimeer: Coating.         Same as for General Corrosion of Item H1.1.1 Aboveground piping and fittings.       Same as for General Corrosion of Item H1.1.1         Aboveground piping and fittings are protection, per shalad coating, mapping, and cathodic protection, south as consing, wrapping, and cathodic protection of underground piping and fittings.       Yes.         Same as for General cortosion of the meteral cortion of underground piping and fittings.       Same as for General Cortosion of Item, H1.1.1 Aboveground piping and fittings.       Yes.         Same as for General cortosion of the meteral contion of underground piping and fittings are protected, per stable areado	Λ	walkdowns and maintenance	function of the component. Plant walkdowns should	AMP
wilkdown guidelines should require visual inspection for degraded pairs and reporting the walkdown results.       Actions: Paint or coating should prevent or mitigate correstor by protecting the external surfaces of the component from environmental exposule. (3) Parameters motioned/Inspected: The AMP should utilize plant system walkdowns to monitor centreplegradation, which is a consultation of pair or coating inspecting and contrastic of Aging Effects: Degradation of meterials. (4) Detection of and the extension of aging effects of corrosion on eternal surfaces of the component has not coursed and intended functions are maintained. (5) Monitoring and Trending: The effects of corrosion are detectable by visual techniques and. based on operating experience, plant system walkdown during each outage provide for timely detection of aging effects. (6) Acceptance Criteria: Any executions program. QA procedures. Site roview and approval process, and administrative controls: Site contretive and should continue to be adequate for benese renewal. (10) Operating Experience. Coating degradation: such as faking and peeling, has occurred. The safety Telade-systems and should continue to be adequate for benese renewal. (2) Operating Experime: Coating degradation: Notice 80-80-8.         Same as for General Corrosion of Item H1.1.1 Aboveground piping and fittings are protected, per standard industry practice, with external coating and wrapping and a cathodic protection system. Other suitable means may be used to montor the condition of underground piping.       Yes. Same as for General Corrosion of Item H1.1.1 A		procedures. The plant system	cover entire surface of the component. (2) Preventive	
visual inspection for degraded paints before during and after cach vortage and reporting the walkdown results.       is consistent by protecting the external surfaces of the system voircomental exposure. (3) Parameters Monitored/Inspected: The AMP should utilize plant and protectings and the QA procedures (should require a review and evaluation of the walkdown findings. Corrective actions should be initiated as necessary.         Mrefal       It is an effective method to ensure that effects of corrosion on externing that the paint or coating is flact is an effective method to ensure that effects of corrosion on externing that the paint or coating is flact is an effective method to ensure that effects of corrosion on externing. The effects of corrosion are detectable by visual techniques and, based on operating experience, plant system walkdown during each outage provide for timely detection of aging effects. (6) Acceptance Criteria: Any essence (gradation should be reported and should require further evaluation. (10) Operating Experience, coating degradation, such as flaking and peeling, has occurred in the safety related systems and structures partice. Information Notice 98-09).       Yes, no generic AMP         Same as for General Corrosion of Item H1.1.1 Aboveground piping and fittings are protected, per standard industry practice, with external coating and wrapping and a cathodic protection system. Other suitable means may be used to monitor the condition of underground piping.       Yes, Elements 2 through age to exist the external coating and wrapping and a cathodic protection system. Other suitable means may be used to monitor the condition of underground piping.       Yes, Elements A should be should	<pre>/  </pre>	walkdown guidelines should require	Actions: Paint or coating should prevent or mitigate	
before chring and shore each outage.         and reporting the walkdown result.         When execting degradation is found, the plant mainterfance procedures for pairs and procedures offstande review and evaluation of the walkdown flucture are view and evaluation of the walkdown flucture are view and evaluation of the walkdown flucture method to ensure that effects of corrosion on external surfaces of the component has not occurred and intended functions are maintained. (5) Monitoring and Trending: The effects of corrosion are detectable by visual techniques and, based on operating experience, plant system walkdown during each outage provide for timely detection of aging effects. (6) Acceptance Criteria Any executive actions should be indicated an external surfaces of the component has not occurred and intended functions should be reported and should continue to be adequate for hence renewal. (10) Operating Experience: Coating degradation, such as flaking and peeling, has occurred in the safety Teited experience. How MP is the effects of corosion of liem H1.1.1 Aboveground piping and fittings.         Some as for General Corrosion of times reported, piping and fittings are protected, per standard industry practice, with external coating and wrapping and a calholic protection system. Other suitable means may be used to monitor the condution of underground piping.       Yes, Elements 2 thru 6 standard industry practice, with external coating and wrapping and a calholic protection system. (2) Preventive Actions: Per industry practice, and system walkdown of underground piping is coated with protective coating, such as tor or synthetic coating, such as tor or synthetic coating, such as tor or synthetic coating, such as the condition of underground piping.       Yes, Plenents 2 thru 6 stoud be from contacting with aggressive soil environment. A cathodic protection system may also be used to		visual inspection for degraded paint,	corrosion by protecting the external surfaces of the	
and reporting the walkdown results. When execting degradation is found it QA plant mainterfance procedures for peint and protective setting degradation disety related to potential loss of materials." (4) Detection of Aging Effects: Degradation of exaluation of the walkdown findings. Corrective actions should be initiated as eccessary.Monitored/Inspected: The AMP should willing and procedures /should require a review and egradation of paint or coating is infact is an effective method to ensure that effects of corrosion on external surfaces of the component has not occurred and intended functions are maintained. (3) Monitoring and Trending: The effects of corrosion are detectable by visual techniques and, based on operating experimee, plant system walkdown fouring each outage provide for timely detection of aging effects. (6) Acceptance Criteria: Any exempting adgradation, which, since the set of corrosion are detectable by visual techniques and, based on operating experimence. Costing depradation, such as faking and peeling, has occurred in the set ordinance program. QA procedures, site review and approval process, and Administrative controls should require for hense renewal. (10) Operating Experience: Costing degradation, such as faking and peeling, has occurred in the safety Teisted systems and structures QMCC Information Notice 98-03.Yes.Same as for General Corrosion of Item H1.1.1 Aboveground piping and fittings are protection, per angle and fittings are protection, for managing the effects of corrosion on the intended function of underground piping for diesel fuel of underground piping and fittings are protection, for managing the effects of corrosion on the intended function of underground piping for diesel fuel of underground piping and fittings are protection, for managing the effects of corrosion on the intended fu		before, during, and after each outage.	component from environmental exposure. (3) Parameters	
When sesting degradation is found, the plant mainteriance procedures septements and protectly secting and the QA procedures, should require a review and evaluation of the walkdown fundings. Corrective actions should be initiated as necessary.       system walkdowns to monitor searing/their degradation of the exterior carbon steel surfaces cannot occur without degradation of paint or coating inspecting and confirming that the paint or coating is intact is an effective method to ensure that effects of corrosion on external surfaces of the component has not occurred and intended functions are maintained. (3) Monitoring and Trending: The effects of corrosion are detectable by visual techniques and, based on operating experience, plant system walkdown during each outage provide for timely detection of aging effects. (6) Acceptance Ortrols: Site corrective actions program. QA procedures, site review and approval process, and administrative controls should be implemented in accordance with Appendix B to 10 CFR Part 50 requirements and should continue to be adequate for hoener enewal. (10) Operating Experience: Coating degradation. Notice 98-039.       Yes.         Same as for General Corrosion of Item H1.1.1 Aboueground piping and fittings.       (1) Scope of Program: The program relies on preventive measures such as coating, wrapping, and cathodic protection, for managing the effects of corrosion on the intended functions: Fer industry practice. MMP       Yes.         The external surfaces of the diesel fuel of underground piping and fittings are protection, exting and wrapping and a cathodic protection system. Other suitable means may be used to monitor the condition of underground piping.       Yes. Plements 2 thru 6 should be underground piping in condition for underground piping for or protecting piping from contacting with agressive soil environment. A cathodic protection system may als	$\setminus$	and reporting the walkdown results.	Monitored/Inspected: The AMP should utilize plant	
plant mainterfance procedures for pairing and the CA.         and protective sections and procedures and procedures. Should require a review and evaluation of the walkdown findings.         Corrective actions should be initiated as necessary.         metal         metal<	N	When coating degradation is found, the	system walkdowns to monitor coating/degradation, which-	K
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protected, per standard industry practice, with external coating and wrapping and a cathodic protection system. Other suitable means may be used to monitor the condition of underground piping.	ļ	oil underground piping and fittings are	measures such as coating, wrapping, and cathodic	Elements 3
practice, with external coating and wrapping and a cathodic protection system. Other suitable means may be used to monitor the condition of underground piping.		protected, per standard industry	protection, for managing the effects of corrosion on the	thru 6
wrapping and a cathodic protection system. Other suitable means may be used to monitor the condition of underground piping. system. (2) Preventive Actions: Per industry practice, underground piping is coated with protective coating, such as tar or synthetic coating, and is wrapped with protective paper or plastic during installation for protecting piping from contacting with aggressive soil environment. A cathodic protection system may also be used to mitigate corrosion by counteracting galvanic activity. (3) Parameters Monitored/Inspected: If methods other than coating and cathodic protection are used, these methods must be described. The effectiveness of the		practice, with external coating and	intended function of underground piping for diesel fuel oil	should be
system. Other suitable means may be used to monitor the condition of underground piping. underground piping. underground piping. underground piping.		wrapping and a cathodic protection	system. (2) Preventive Actions: Per industry practice,	further
used to monitor the condition of underground piping. as tar or synthetic coating, and is wrapped with protective paper or plastic during installation for protecting piping from contacting with aggressive soil environment. A cathodic protection system may also be used to mitigate corrosion by counteracting galvanic activity. (3) Parameters Monitored/Inspected: If methods other than coating and cathodic protection are used, these methods must be described. The effectiveness of the contacting for		system. Other suitable means may be	underground piping is coated with protective coating, such	evaluated
underground piping.paper or plastic during installation for protecting piping from contacting with aggressive soil environment. A cathodic protection system may also be used to mitigate corrosion by counteracting galvanic activity.(3) Parameters Monitored/Inspected: If methods other than coating and cathodic protection are used, these methods must be described. The effectiveness of the coating for		used to monitor the condition of	as tar or synthetic coating, and is wrapped with protective	
from contacting with aggressive soil environment. A cathodic protection system may also be used to mitigate corrosion by counteracting galvanic activity. (3) Parameters Monitored/Inspected: If methods other than coating and cathodic protection are used, these methods must be described. The effectiveness of the controls		underground piping.	paper or plastic during installation for protecting piping	
cathodic protection system may also be used to mitigate corrosion by counteracting galvanic activity. (3) Parameters Monitored/Inspected: If methods other than coating and cathodic protection are used, these methods must be described. The effectiveness of the			from contacting with aggressive soil environment. A	
corrosion by counteracting galvanic activity. (3) Parameters Monitored/Inspected: If methods other than coating and cathodic protection are used, these methods must be described. The effectiveness of the coating and			cathodic protection system may also be used to mitigate	
(3) Parameters Monitored/Inspected: If methods other than coating and cathodic protection are used, these methods must be described. The effectiveness of the			corrosion by counteracting galvanic activity.	
than coating and cathodic protection are used, these methods must be described. The effectiveness of the			(3) Parameters Monitored/Inspected: If methods other	.
methods must be described. The ellectiveness of the			than coating and cathodic protection are used, these	
			methods must be described. The effectiveness of the	
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H	1. DIESEL F	JEL OIL SYSTEM		<u> </u>	Ading	Aging	
	Structure and	Region of	1	Environ-	Effect M	lechanism	References
Item	Component	Interest	Material	ment			
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			<u> </u>			Ditting	Plant Technical
H112	Piping	Underground	Carbon Steel	Soil	Local Loss of	Corrosion	Specifications.
1		Piping and		1	Material	and Crestice	Special data
		Fittings	l		1	Corrocion	
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1110	Pining	Underground	Carbon Steel	Soil	Corrosion	WIICTO-	Specifications
1	[ " iping	Piping and			Product	piologically	Lapecinications.
	$  \frown$	Fittings	+	1 1	Builden	Finimeneed	
$  \rangle$	$  \backslash \rangle$			+	1055 loss	COTTOSION	ļ
	+	+			of	<b>N</b>	1
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Existing Aging Management Program (AMP)	Evaluation and Technical Basis	Evaluation
	(continued from previous page) and cathodic protection system, per standard industry practice, is measured by measuring coating conductance, by pipe-to-soil potential surveys, by conducting bell hole examinations to visual examine the condition of the coating. Coating and wrapping, however, can degrade with time and corrosion may occur. Also, cathodic protection requires periodic monitoring and maintenance to ensure that it is functioning properly. The AMP chould include- inspection of a sample of the buried piping to ensure that toating and wrapping are intact and corrosion is edequately meanged. Also, a monitoring melintenance program should be implemented to ensure that cathodic protection is functioning properly. (4) Detection of Aging Effects: An increase in coating conductance or the indication that certain portions of the pipes are not adequately protected indicates coating degradation. Inspecting a sample of the buried pipe and confirming that the paint or coating is intact is an effective method to ensure that effects of corrosion on external surfaces of the pipe has not occurred and intended functions are maintained (5) Monitoring and Trending: The effects of corrosion are detectable by visual techniques and, based on operating experience, inspection of a sample of the buried pipe should provide for timely detection of aging effects: (6) Acceptance Criteria; in accordance with accepted industry practice, the assessment of the buried pipe should provide for timely detection system measurements should be conducted on an annual basis. Also, monitoring the coating conductance verse time or current requirements verse time gives an indication of the condition of the coating and cathodic protection system. (7-9) Corrective Actions, Confirmation Process, and Administrative controls: Site corrective actions program. QA procedures, site review and approval process, and administrative controls are implemented in accordance with Appendix B to 10 CFR Part 50 requirements, and will continue to be adequate for licen	
Same as for General, Galvanic corrosion, and Microbiologically- Influenced Corrosion of Item H1.1.2 Underground Piping and Fittings.	Same as for General, Galvanic corrosion, and Microbiologically-Influenced Corrosion of Item H1.1.2 Underground Piping and Fittings.	Yes, Elements 3 thru 6 should be further evaluated
Same as for General, Galvanic corrosion, and Microbiologically- Influenced Corrosion of Item III-12 Underground Piping and Puttings.	Same as for General. Galvanic corrosion, and Microbiologically-Influenced Corrosion of Item H1.12 Underground Piping and Fittings.	Yes. Elements 3 thru 6 should be further evaluated



VШ	AUXILIARY SYS	IEMS	r				
	H1. DIESELF	UEL OIL SISIES		Environ	Adina	Ading	
Item	Structure and Component	Region of Interest	Material	ment	Effect	Mechanism	References
H1.2.1 H1.2.2	, Valves	Body & Bonnet, Closure Bolting	Carbon Steel or Alloy Steel	Sun, Weather, Humidity and Moisture	Loss of Material	General Corrosion, <del>Coating</del> Degradation	Operating Experience GL 98-04.
H1.2.1 H1.2.2	, Valves	Body & Bonnet, Closure Bolting	Carbon Steel or Alloy St <del>ee</del> l	Sun. Weather. Humidity and Moisture	Local Loss of Material	Pitting and Crevice Corrosion, G <del>oating,</del> Degradation	Operating Experience GL 98-04.
H1.3.1 H1.3.2	, Pump	Casing Closure Bolting	Carbon Steel or Alloy Steel	Sun, Weather, Humidity and Moisture	Loss of Material	General Corrosion, <del>Coating,</del> Degradation	Operating Experience GL 98-04.
H1.3.1 H1.3.2	Pump	Casing, Closure Bolting	Carbon Steel or Alloy Steel	Sun, Weather, Humidity and Moisture	Local Loss of Material	Pitting and Crevice Corrosion, <del>Coating –</del> <del>Degradatio</del> n	Operating Experience GL 98-04.
H1.4.1	Tank	Internal Surfaces	Carbon Stee	Phel Ox	Loss of Material	General Corrosion and Micro- biologically -Influenced Corrosion	ASTM D 270. ASTM D 975. ASTM D 2276. Plant Technical Specifications.

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H1. DIESEL FUEL OIL SYSTEM

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Existing	Dealer the second Dealer to the	Further
Aging Management Program (AMP)	Evaluation and Technical Basis	Evaluation
Same as for General Corrosion of Item H1.1.1 Aboveground piping and fittings.	Same as for General Corrosion of Item H1.1.1 Aboveground piping and fittings.	Yes, no generic AMP
Same as for General Corrosion of Item H1.1.1 Aboveground piping and fittings.	Same as for General Corrosion of Item H1.1.1 Aboveground piping and fittings.	Yes. no generic AMP
Same as for General Corrosion of Item - H1.1.1 Aboveground piping and fittings.	Same as for General Corrosion of Item H1.1.1 Aboveground piping and fittings.	Yes. no generic AMP
Same as for General Corrosion of Item H1.1.1 Aboveground piping and fittings.	Same as for General Corrosion of Item H1.1.1 Aboveground piping and fittings.	Yes. no generic AMP
The AMP consists of a combination of surveillance and maintenance procedures. The tank internal surfaces are coated with protective coating to prevent the exposure of carbon steel tank surfaces to fuel oil contaminated with water, bacteria and fungal; and the quality of fuel oil is controlled and maintained in accordance with ASTM specifications D 270, "Standard Method of Sampling Petroleum and Petroleum Products." D 975. "Standard Specification for Desel Fuel Oils." and D 2276, "Standard Test Method for Particular Contamination in Aviation Fuel." Also, because water collects on the bottom of the tank and may cause corrosion, water is periodically drained. If excessive water is found, corrective actions are taken to prevent recurrence. Additionally, new fuel oil deliveries are treated with corrosion inhibitors and a biocide and sampled and analyzed for water content."	(1) Scope of Program: The program is focused on managing, the conditions that cause general and microbiologically- induced corrosion of the tank internal surfaces, i.e., the program manages the potential of the tank internal surfaces to be exposed to fuel oil contaminated with water, biologics and fungal. (2) Preventive Actions: Coatings prevent or mitigate corrosion by protecting the internal surfaces of the tank from contacting with water, biologics, and fungal. Periodic draining of water collected at bottom of the tank minimizes the amount of water and the length of contact time. Compliance with ASTM standards D 270 and D 975 and addition of corrosion philbitors and biorides to new fuel oil, provide adequate measures to control and maintain the standards for diesel fuel oils. (3) Parameters Monitored/Inspected: The AMP monitors fuel oil standards, and the water, biological, and fungal levels in the fuel oil, which cause loss of material of the tank internal surfaces. ASTM standard D 270 defines fuel oil specifications for viscosity, percent water and sediment, particulate contamination, and biologics, and requires multilevel sampling and analysis of fuel oil to letect the presence of water, biologic and fungal, which cause corrosion of fank internal surfaces. ASTM standard D 2276 provides guidance to quantify insoluble particulate contamination in diesel fuel. (4) Detection of Aging Effects' Aging degradation of the diesel fuel oil tank can not occur without exposure of the tank internal surfaces to contaminants in the fuel oil, such as water, biologics and fungal. Although compliance with diesel fuel oil standards and periodic multilevel sampling provide assurance that fuel oil contaminants are below acceptable levels, the AMP does not ensure that coating fegradation and exposure of tank internal surfaces to	Yes. Element 4 should be further crainated
(All A)	See Chapter KI the and avaluation of the Fuel Oil Chemisty Program DRAFT-	12/06/99

E	1. DIESEL FU	EL UL SISIEM	<u> </u>		A	Adied	
Item	Structure and	Region of Interest	Material	Environ- ment	Aging Effect	Aging	References
Item	Component					-	
		-					
H1.4.1	Tank	Internal Surfaces	Carbon Steel	Fuel Oil. Water	Local Loss of Material	Pitting Corrosion and Crevice Corrosion	ASTM D 270. ASTM D 975. ASTM D 2276. Plant Technical Specifications.
H1.4.1	Tank	Internal Surfaces	Carbon Steel	Fuel Oil. Water	Buildup of Deposit	Biofouling	ASTM D 270. ASTM D 975. ASTM D 2276. Plant Technical Specifications.

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Existing       Further         Aging Management Program (AMP)       Evaluation and Technical Basis       Evaluation         (continued from previous page)	
Aging Management Program (AMP) Evaluation and Technical Basis Evaluation (continued from previous page)	
(continued from previous page)	
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water, biologics, and fungal has not occurred. Degradation	
of the protective coatings may expose tank internal	
surfaces to conditions that cause corrosion. The AMP	
should include inspection of tank internal surfaces to	
detect potential degradation of protective coating and	
measurement of tank bottom and sides near bottom for	
thickness using UT method. (5) Monitoring and Trending:	
Based on industry operating experience, quarterly	
sampling and analysis of fuel oil provide for timely	
detection of conditions directly related to corrosion of	
tank internal surfaces before the potential loss of the	
intended function of diesel fuel oil tank/ (6) Acceptance	
Criteria: ASTM standard D 975 specifies acceptance	
criteria for the limits of water content, bacteria and fungal	
levels. Corrective actions are taken to prevent recurrence	
when the specified limits for fuelou standards are	
exceeded of when excessive water is in affect of the	
periodic surveillance. (7) Corrective Actions, Specific	
confective actions are implemented in action cancel with the	
plant quality assurance (g/r) program. For chample,	1
the energies limits for full of standards are exceeded or	
when excessive units is infrained during periodic	
when extensive when the presence of biological	
activity is confirmed A biggide is added to fuel oil. (8 & 9)	
Confirmation Process, and Administrative Controls: Site	
OA procedures review and approval processes, and	
administrative controls are implemented in accordance	
with requirements of Appendix B to 10 CFR Part 50 and	
will continue to be adequate for the period of license	
renewal. (10) Operating Experience: Surveillance of diesel	
fuel oil tapks for =20 years of operation has shown no	
aging degradation. The results of quarterly sampling of a	
fuel oil tank for =15 years of operation indicate that the	
water content, biologics, and fungal levels were well below	
acceptance criteria.	
Same as for General and Same as for General and Microbiologically-Influenced Yes,	
Microbiologically-Influenced Corrosion of Item H1.4.1 Tank internal surfaces. Element 4	
Corrosion of Item H1.4.1 Tank internal should be	
surfaces.	
evaluated	
Same as for General and Same as for General and Microbiologically-Influenced Yes,	
Microbiologically-Influenced Corrosion of Item H1.4.1 Tank internal surfaces. Element 4	
Corrosion of Item H1.4.1 Tank internal should be	
surfaces.	
evaluated	

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VII	AUXILIARY SYS: H1. DIESEL F	TEMS UEL OIL SYSTEM	4	6	Th		
Item	Structure and Component	Region of Interest	Material	Environ- ment	Aging Effect	Aging Mechanism	References
H1.4.1	Tank	Internal Surfaces	Carbon Steel	Fuel Oil, Water	Serrecion Product Buildap Less of MATERIAL	Micro- biologically Influenced Corrosion	ASTM D 270. ASTM D 975. ASTM D 2276. Plant Technical Specifications.
H1.4.2	Tank	External Surfaces	Carbon Steel	Sun, Weather, Humidity and Moisture	Los <del>s of A</del> Material	General Corrosion, Coating Degradation	Operating Experience GL 98-04
H1.4.2	Tank	External Surfaces	Carbon Steel	Sun, Weather, Humidity and Moisture	Local Loss of Material	Pitting Corrosion and Crevice Corrosion, Coating Degradation	Operating Experience GL 98-04
H1.4.3	Dank	Caulking and Sealant	Plastic Coal- Tar	Sun Weather, Humidity	Increased Hardness and Shrinkage	Weather	<u> </u>
	Ν			Moisture			

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VII AUXILIARY SYSTEMS H1. DIESEL FUEL OIL SYSTEM

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/	Aging Management Program (AMP)	Evaluation and Technical Basis	Further Evaluation	
	Same as for Ceneral and Microbiologically Influenced Corrosion of Item H1.4.1 Track Internal surfaces FUE/Oi/Chemistry Same as for General Corrosion of Item H1.1.1 Aboveground piping and fittings.	Same as for General and Microbiologically Influenced Corrosion of Item H1.4.1 Tark internal surfaces. See Chapter II for an evaluation Of the Fuel Oil Cremistry Program Same as for General Corrosion of Item H1.1.1 Aboveground piping and sittings.	Ves, Elements 4 should be further valuated Yes, no generic AMP	Alo
	Same as for General Corrosion of Item H1.1.1 Aboveground piping and fittings.	Same as for General Corrosion of Item H1.1.1 Aboveground piping and fittings.	Yes, no generic AMP	
	To prevent the tank bottom from corrosion, the joints between the tank bottom and the concrete support rike are sealed with caulking and scalant.	Caulking and sealing help to protect tank bottom from corrosion by preventing water and moisture contacting with tank bottom. Caulking and sealant, however, may degrade and corrosion may occur. Thus, a new caulking/sealant inspection program should be implemented to ensure that caulking and sealant are intact and corrosion is adequately managed.	Yes. no generic AMP	

### GALL REPORT – MECHANICAL DISCIPLINE COMMENTS SECTION VIIH.1

GALL SECTION	TITLE	ITEM NO.	PAGE	COMMENT
VII H1-1	Diesel Fuel Oil System	H1.1.1, H1.2.1, H1.2.2, H1.3.1, H1.3.2, & H.1.4.2	VII H1-4, 8, & 12.	Delete "coating degradation" from the Aging Mechanism column. BASIS: Failure of the coating does not result in a loss of the component function. The aging mechanism is corrosion that occurs as a result of the degradation of the coating that allows the environment to contact the metal surface.
VII H1-2	Diesel Fuel Oil System	H1.1.1, H1.2.1, H1.2.2, H1.3.1, H1.3.2, & H1.4.2	VII H1-5, 9, & 13. VII H1-4, 8, & 12.	The Existing Aging Management Program (AMP) and the Evaluation and Technical Basis columns should be reworded to say that the walkdowns inspect for signs of metal degradation instead of coating degradation. BASIS: The aging effect that this program should manage is loss of material of the underlying metal, which may not be occurring even though the coating is degraded. Also, walkdowns before, during, and after each refueling outage is excessive. Recommend that walkdowns need only be performed during each refueling outage.
VII H1-3	Diesel Fuel Oil System	H.1.1.2	VII H1-6	Delete Item H1.1.2 BASIS: Corrosion product buildup on the external surfaces of buried pipe will not result in a loss of the component function.
VII H1-5	Diesel Fuel Oil System	H1.1.2	VII H1-7	The wording in the Evaluation and Technical Basis column suggest periodic visual inspection of buried piping. Recommend deleting the wording and considering other alternatives. BASIS: Visual inspection of the buried piping requires digging around the pipe. This creates a potential risk to the coatings in that during the course of excavation and backfill the coatings could be damaged. Such damage could easily go undetected. This damage then would lead to corrosion of the underlying material that would not have occurred if it had been left alone.
VII H1-6	Diesel Fuel Oil System	H1.4.1	VII H1-12	Under the Environment column, delete the reference to water as part of the internal environment of the fuel oil tanks. BASIS: Water is a contaminant and should not be listed as an environment. Contaminants is treated water environments are not listed as the environment in other systems.
VII H1-7	Diesel Fuel Oil System	H.1.4.1	VII H1-9	Delete exiting text under the Existing Aging management program column and the Evaluation and Technical Basis column and replace with a reference to the Fuel Oil Chemistry Program. BASIS: The program described here is based on test methods described

### GALL REPORT – MECHANICAL DISCIPLINE COMMENTS SECTION VIIH.1

GALL SECTION	TITLE	ITEM NO.	PAGE	COMMENT
				in the ASTM Standards. These are not plant programs. The plant program, typically the Chemistry Program, implements these standards for testing. Replace the program with the generic Chemistry Program (Fuel Oil) that has been provided.
VII H1-8	Diesel Fuel Oil System	H1.4.1	VII H1-12	Under the Aging Effect column, change "corrosion product buildup" to "local loss of material." BASIS: Corrosion product buildup on the external surfaces of the tank will not result in a loss of the component function.
VII H1-9	Diesel Fuel Oil System	H1.4.1	VII H1-12	Caulking and sealants perform no function in support of the component function of the tank or supports. Therefore, they are not within the scope of license renewal and should be deleted from this table.
VII H1-10	Diesel Fuel Oil System	H1.4.1	VII H1-13	In lieu of referencing back to a previous section here; insert the Fuel Oil Chemistry Program

#### H2. Emergency Diesel Generator System

- H2.1 Diesel Engine Cooling Water Subsystem
  - H2.1.1 Pipe and Fittings
- H2.2 Diesel Generator Air Starting Subsystem
  - H2.2.1 Pipe and Fittings
  - H2.2.2 Hand Valve
  - H2.2.3 Check Valve
  - H2.2.4 Drain Trap
  - H2.2.5 Air Accumulator Vessel
- H2.3 Diesel Generator Combustion Air Intake Subsystem
  - H2.3.1 Piping and Fittings
  - H2.3.2 Filter
  - H2.3.3 Muffler
- H2.4 Diesel Generator Combustion Exhaust Air Subsystem
  - H2.4.1 Piping and Fittings
  - H2.4.2 Muffler
- H2.5 Diesel Generator Fuel Oil Subsystem
  - H2.5.1 Day Tank
  - H2.5.2 Dip Tank
  - H2.5.3 Strainer

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#### H2. Emergency Diesel Generator System

#### System, Structures, and Components

The system, structures, and components included in this table comprise the emergency diesel generator system and contain piping, valves, filter, muffler, strainer, day tank, and dip tank for cooling water, starting air, combustion air intake, combustion exhaust air, and diesel fuel oil subsystems. Based on US Nuclear Regulatory Commission Regulatory Guide 1.26, "Quality Group Classifications and Standards for Water, Steam, and Radioactive-Waste-Containing Components of Nuclear Power Plants," all components in the emergency diesel generator system are classified as Group C Quality Standards.

#### System Interfaces

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The systems that interface with the emergency diesel generator system include the diesel fuel oil system (Table VII H1) and the closed cycle cooling water system (Table VII C2).

#### H2. EMERGENCY DIESEL GENERATOR SYSTEM

<b></b>	Structure and	Region of	1	Environ-	Aging	Aging	
Item	Component	Interest	Material	ment	Effect	Mechanism	References
Item H2.1.1	Component Diesel Engine Cooling Water Subsystem	Region of Interest Piping and Fittings	Material Carbon Steel	Environ- ment Chemically Treated Deminera- lized Water	Aging Effect Loss of Material	Aging Mechanism Pitting and Corrosion, General Lorrosim VII H2-1	References ASME Section XI (edition specified in 10 CFR 50.55a). Plant Technical Specifications.
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See Chapter KI for an evaluation of The Closed Cooling Water Chemistry Program

Existing Aging Management Program (AMP) The AMP cilics on minimulag impurities by monitoring and maintaining the chemistry of exists maintaining the chemistry of exists and inservice inspection (150 in consists of monitoring and controlling the system water chemistry (i.e. the Chemically Trackel Demineralized chemistry (i.e. the Chemically Trackel Demineralized the system full of ) a Parameters monitored generally include dissolved water, will help to mitigate the effects of the system full of ) Parameters monitored generally include dissolved from dissolved Gopper. chieddes maintain category D-B of ASME Section XI Table IVD 2500-1 requires visual VT-2 examination category D-B of ASME Section XI Table IVD 2500-1 requires visual VT-2 examination and yourself include dissolved organ dissolved and yourself include dissolved form dissolved form and you category the demineralized and your exist and system Hakage et all system hydrositic text the dissolved and you and include dissolved organ of a ASME Section XI Table IVD 2500-1 requires visual VT-2 examination constants and yourself include dissolved organ of a ASME Section XI the program regions of use or staggett flow conditions that may cause crewice corrosis profitting at the crewices where impurities and/or corrosis on a bid dista and plant technical specification. (50 Monitoring grid Treating: The freq	H2. EMERGENCY DIESEL GET	ERATOR SISTEM	
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Section XI IWD-3000. <i>(M)</i> Corrective Actions: Plant chemistry control program specifies the target values for each chemistry parameter in the treated water. If the specified values are exceeded, corrective actions are initiated to bring the chemistry parameters back to normal levels. Corrective actions of the above one time inspection are based on the results of the inspection. Furthermore, IWA-5250 requires that the source of		hydrostatic tests are evaluated in accordance with ASME	
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		Furthermore, IWA-5250 requires that the source of	
leakage detected during the pressure test should be located		leakage detected during the pressure test should be located	
and evaluated for corrective measures. Repair and		and evaluated for corrective measures. Repair and	
replacement are in accordance with		replacement are in accordance with	L

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AUXILIARY SYSTEMS

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#### H2. EMERGENCY DIESEL GENERATOR SYSTEM



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Existing		Further
Aging Management Program (AMP)	Evaluation and Technical Basis	Evaluation
	tontinued from previous page- IWA-4000 and IWA-7000. (8 & 9) Confirmation Process, and Administrative Controls: Site corrective actions program. QA procedures, site review and approval process, and administrative controls are implemented in accordance with Appendix B to 10 CFR Part 50 requirements and will continue to be adequate for license renewal. (10) Operating Experience: Within the closed cycle cooling water system, there are regions of low or stagnant flow conditions that may cause crevice corrosion end pairing and for	
$\sim$	controlive chemicals may concentrate.	
Bue to the low flow velocity and low operating temperature of the EDG cooling water system, the effects of	(1) Score of Program No AMP exists because the low fluid flow conditions and low operating temperature are outside the maximum erosion/corrosion conditions. (2)	Yes. no generic AMP
erosion/corrosion are generally not monitored/inspected. However, the	Preventive Actions: Inspection program should be implemented for the EDG cooling water system to ensure that empirical for the suscentible	
system is chemically treated with hydrazine to lower the dissolved oxygen level in order to minimize the corrosion effects. Lowering the oxygen content	component locations. (3) Parameters Monitored/Inspected: Inspection such as ultrasonic examination should be conducted periodically at the	
increases the succeptibility of the carbon steel pioing to erosion/ corrosion. Therefore, an inspection program should be implemented to	susceptible locations such as elbows and tees where hund flows are much higher. The parameter inspected is the wall thickness. (4) Detection of Aging Effects: Any evidence of wall thinning due to erosion/corrosion should	
ensure that erosion/corrosion has not occurred at susceptible locations of the EDG cooling water components. Corrective actions should be initiated if	be detected by ultrasonic testing. (5) Monitoring and Trending: Effects of erosion/corrosion are detectable by ultrasonic examination and inspection is periodic should assure timely detection of aging effects before there is a	
the wall thickness is insufficient for the component to perform its intended function during the period of extended	loss of the component intended function. (6) Acceptance Criteria: The inspection program should include acceptance criteria against the need for corrective action. (7-9) Corrective Actions, Confirmation Process, and	
	Administrative Controls: Site corrective actions program, QA procedures, site review and approval process, and administrative controls are implemented in accordance	
ALL	continue to be adequate for license renewal. (10) Operating Experience: Wall thinning due to erosion/corrosion is a significant problem in high-energy carbon steel piping	
H6-0	systems, such as feedwater line. Numerous cases of wall thinning infeedwater line due to erosion/corrosion have been reported in NRC IE Bulletin 87-01, Generic Letter (GL)	
	89-08, Information Notice (IN) 86-106 and Supplements 1, 2, and 3, IN 87-36, and IN 88-17. Although, no major problem of wall thinning has occurred in the DFG cooling	V
	information for applicability to their facilities and	

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Item	Component	Interest	Material	Environ- ment	Aging Effect	Aging Mechanism	References
H2.2.1 thru H2.2.5	Diesel Engine Starting Air Subsystem	Piping and Fittings, Hand Valve, Check Valve, Drain Trap, Air Accumulator Vessel	Carbon Steel	Moist Air	Loss of Material	General, Pitting, and Crevice Corrosion	-
H2.3.1 H2.3.2 H2.3.3	Diesel Engine Combustion Air Intake Subsystem	Piping and Fittings. Filter. Muffler	Carbon Steel	Moist Air	Loss of Material	General, Pitting, and Crevice Corrosion	

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H2. EMERGENCY DIESEL GENERATOR SYSTEM

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Specific Aging Managomet AUXILIARY SYSTEMS 711 H2. EMERGENCY DIESEL GENERATOR SY Further Existing Evaluation and Technical Basis Evaluation Aging Management Program (AMP) (1) Source of Program: The program should focus on Yes. Moisture in the EDG starting air managing the effects of corrosion on the intended function subsystem may result in corrosion of no generic AMP. of the EDG starting air components. (2) Preventive, the starting air components. The AMP should rely on regular maintenance. Actions: Periodic visual inspection, periodic overnaul. and regular maintenance of the EDG starting air overhaul, and periodic inspection of the components should be conducted to mitigate the aging EDG air starting compenents such as starting air distributor and filters, hand effects due to corrosion. (3) Parameter Monitored/Inspected: The EDG starting air components valves, and check valves for inspection specifically for the presence of should be periodically inspected for the presence of corrosion debris that indicates the starting air subsystem is undergoing corrosion. (4) Detection of Aging Effects: corrosion debris that could indicate the starting air subsystem is undergoing The debris due to general corrosion such as superficial rust correction. Correction actions should be speckles and a slight dusting of loose passive surface rust should be observed by visual inspection. Periodic inspection should be conducted to provide timely detection of the aging effects before there is a loss of the component intended function. (5) Monitoring and Trending: Periodic inspection and overhaul should provide data for trending. (6) Acceptance Criteria: Any significant degradation should reported and evaluated. (8-9) Confirmation Process, and Administrative Controls: Site corrective actions program, QA procedures, site review and approval process, and administrative controls should be implemented in accordance with Appendix B to 10 CFR Part 59 requirements and should continue to be adequate for ligense renewal. (10) Operating Experience: No significant aging problem is reported of the EDG starting or components. Moisture in the EDG combustion air (1) Scope of Program: The program should focus on Yes. intake system may result in corrosion managing the effects of corrosion on the intended function no generic in the EDG air intake components/ The of the EDG air intake components. (2) Preventive Actions: AMP. Periodic visual inspection, periodic overhaul, and regular AMP should rely on regular maintenance, overhaul, and periodic inspection of the EDG ar intake components such as air intake filters, intake mufflers, and check valves for maintenance of the EDG air intake components should be conducted to mitigate the aging effects due to corrosion. (3) Parameters Monitored/Inspected: The air intake components should be periodically inspected for the presence of corrosion debris that indicates the air intake system is undergoing convision. (4) Detection of Aging Effects: The debris due of general corrosion such as superficial rust speckles and a slight dusting of loose inspection for the presence of corrosion debris that could indicate the EDG air intake system is undergoing corrosion. Conection actions should be initiated passive surface rust should be observed by visual as necessary. inspection. Periodic inspection should be conducted to provide timely detection of the aging effects before there is a loss of the component intended function. (5) Monitoring and Trending: Periodic inspection and overhaul should provide data for trending. (6) Acceptance Criteria: Any significant degradation should reported and evaluated. (8-9) Confirmation Process, and Administrative Controls: Site corrective actions program, QA procedures, site review and approval process, and administrative controls should be implemented in accordance with Appendix B to 10 CFR Part 50 requirements and should continue to be adequate for license renewal. (10) Operating Experience: No significant aging problem is reported of the EDG air intake components

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F	12. EMERGEN	CY DIESEL GEN	LRAIOR 515	1EM			
Item	Structure and	Region of Interest	Material	Environ- ment	Aging Effect	Aging Mechanism	References
Item H2.4.1 H2.4.2	Component Diesel Engine Combustion Air Exhaust Subsystem	Interest Piping and Fittings. Muffler	Material Carbon Steel	ment Hot Diesel Engine Exhaust Gases containing Moisture and Particulate	Loss of Material	General, Pitting, and Crevice Corrosion	Plant Technical Specifications.
H2.4.2	Diesel Engine Combustion Air Exhaust Subsystem	Muffler	Carbon Steel	Hot Diesel Engine Exhaust Gases	Wall Thinning	Particulate Wear Erosion	

#### VII AUXILIARY SYSTEMS H2. EMERGENCY DIESEL GENERATOR SYSTEM

DRAFT - 12/06/99

Plant specific Aging Management Activity / Program required AUXILIARY SYSTEMS EMERGENCY DIESEL GENERATOR SYSTEM H2. Further Existing Evaluation Evaluation and Technical Basis Aging Management Program (AMP) Yes (1) Scope of Program: The program should focus or Meleture in the EDO combustion and managing the effects of corrosion on the intended function Element 6 exhaust system may result in corrosion should be of the EDG exhaust air components. (2) Preventive of the EDG exhaust air piping and further Actions: Periodic visual inspection, periodic overkaul, mufflers. The AMP should rely on evaluated. and regular maintenance of the EDG exhaust air, regular maintenance, overhaul, and components should be conducted to mitigate the aging periodic inspection of the EDG exhaust effects due to corrosion. (3) Parameters Monitored/ piping and muffler for inspection Inspected: The EDG exhaust air components should be specifically for the presence of periodically inspected for the presence of corrosion debris corrosion debris that could indicate the that indicates the EDG exhaust air system is undergoing EDG exhaust air subsystem is corrosion. (4) Detection of Aging Effects: The debris due to going corrosion. Correction general corrosion such as superficial rust speckles and a slight dusting of loose passive sufface rust should be observed by visual inspection Periodic inspection should be conducted to provide timely detection of the aging effects before there is a loss of the component intended function. (5) Monitoring and Trending: Periodic inspection and overhaal should provide data for trending. (6) Acceptance Criteria: Any significant degradation should be reported and evaluated .. (8-9) Confirmation Process, and Administrative Controls: Site corrective actions program, QA procedures, site review and approval process, and administrative controls should be implemented in accordance with Appendix B to 10 CFR Part 50 requirements and should continue to be adequate for license renewal. (10) Operating Experience: No significant aging problem is reported of the EDG exhaust ac components (1) Beope of Program: An inspection progr Yes tot exhaust gases with particulate an no generic implemented for managing the aging effects of particulate moisture may erode internal surfaces of AMP wear erosion on the intended function of the EDG exhaust the EDG exhaust air muffler. No AMP air muffler. (2) Preventive Actions: Periodic visual exists for maintaining the interded inspections of the internal surfaces on representative function of the muffler during the samples should be conducted to manage the sting effects period of extended operation. due to particulate wear erosion. (3) Parameters Therefore, an inspection program Monitored/Inspected: The muffler should be disassembled should be implemented to ensure that and inspected for signs of particulate wear erosion. (4) particulate wear erosion of the muffler Detection of Aging Effects: The inspection program should has not occurred and the intended include inspection representative size, inspection function of muffler is maintained. requirements, inspection frequency, acceptance criteria, Corrective actions should be initiated as and corrective actions. Visual inspection is an effective acheosatev. method for detecting wear crosion in a disassembled EDG exhaust air muffler. (5) Monitoring and Trending: Periodic inspection provides data for trending and timely detection of the aging effect. (6) Acceptance Criteria: The inspection program should include acceptance criteria. (7-9) Corrective Actions, Confirmation Process, and Administrative Controls: Site corrective actions program. QA procedures, site review and approval process, and administrative controls are implemented in accordance with Appendix B to 10 CFR Part 50 requirements and will continue to be adequate for license renewal. (10) Operating Experience: No significant aging problem is reported of the whanst air muffler due to particulate wear erosion

#### H2. EMERGENCY DIESEL GENERATOR SYSTEM

······	Structure and	Region of		Environ-	Aging	Aging	
Item	Component	Interest	Material	ment	Effect	Mechanism	References
H2.5.1	Diesel Engine	Day Tank.	Carbon Steel	Diesel Fuel	Loss of	General,	ASTM D 270.
H2.5.2	Fuel Oil	Dip Tank		Oil	Material	Micro-	ASTM D 975.
	Subsystem					biologically	ASTM D 2276.
						Influenced.	
						Pitting, and	
						Crevice	
						Corrosion	
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AUXILIARY SYSTEMS EMERGENCY DIESEL GENERATOR SYSTEM H2.

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VII AUXILIARY SYSTEMS		
H2. EMERGENCY DIESEL GEI	VERATOR SYSTEM	
Existing	Building and Building Bassis	Further
Aging Management Program (AMP)	Evaluation and Technical Basis	Evaluation
influenced corrosion may occur in the	the effects of general corrosion and microbiologically.	Element 4
EDG tanks due to presence of condensed	induced corrosion of the EDG tanks due to exposure to fuel	should be
water and biological contaminants in	oil contaminated with water, biologics and fungal.	further
the fuel oil. The AMP is similar to that	(2) Preventive Actions: Periodic draining of water	evaluated
the Diesel Fuel Oil Storage Tank of the	collected at bottom of the tank minimizes the amount of	NO
Diesel Fuel Oil System (Item H1.4.1 of	ASTM standards D 270 and D 975 and addition of	
Table VII.H1). The AMP/consists of a	corrosion inhibitors and biocides to new fuel oil, provide	
combination of surveillance and	adequate measures to control and maintain the standards	
includes. (1) Periodic draining of water	The AMP monitors water, biological, and fungal levels in	
collected at bottom of the tank. If	the fuel oil, which cause loss of material of the tank	
excessive water is found, corrective	internal surfaces. ASTM standard D 270 defines fuel oil	
actions are taken to prevent recurrence.	specifications for viscosity, percent water and sediment,	
(2) Sampling, monitoring, and maintaining the fuel oil chemistry	particulate contamination, and biologics, and requires	
within specifications established in the	presence of water, biologic and fungal, which cause	
industry odes, such as ASTM	corteston of tank internal surfaces. ASTM standard	
specifications D 270, "Standard Method	D 2276 provides guidance to quantify insoluble	
Products," D 975. "Standard	Aging Effects: Although compliance with diesel fuel oil	
Specification for Diesel Fuel Oils," and	standards and periodic multilevel sampling provide	
D 2276, "Standard Test Method for	assurance that fuel oil contaminants are below acceptable	·
Particular Contamination in Aviation	internal surfaces has not occurred due to exposure to	
created with corrosion inhibitors and a	water, biologics, and fungal. The AMP should include	
biocide and sampled and analyzed for	inspection of tank internal surfaces to ensure no	
water content	degradation of tank internal surfaces and measurement of	
	method. (5) Monitoring and Trending: Based on industry	1
Fuel U.I Chemistry	operating experience, quarterly sampling and analysis of	
Ω <sup>′</sup>	fuel oil provide for timely detection of conditions directly	
rogiam	related to corrosion of tank internal surfaces before the	
4	tanks. (6) Acceptance Criteria: ASTM standard D 975	
	specifies acceptance criteria for the limits of water	
	content, bacteria and fungal levels. Corrective actions are	1
	taken to prevent recurrence when the specifica limits for fuel oil standards are exceeded or when excessive water is	
	drained during periodic surveillance. (7) Corrective	
	Actions: Specific corrective actions are implemented in	
	accordance with the plant quality assurance (QA)	
	program. For example, corrective actions are taken to prevent recurrence when the specified limits for fuel oil	
	standards are exceeded or when excessive water is drained	
	during periodic surveillance. Also, when the presence of	
	biological activity is confirmed, a biocide is added to fuel	
	Controls: Site QA procedures, review and approval	
	processes, and administrative controls are implemented	
	in accordance with requirements of Appendix B to 10 CFR	
	Fart 50 and will continue to be adequate for the period of	1

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#### H2. EMERGENCY DIESEL GENERATOR SYSTEM

Item	Structure and Component	Region of Interest	Material	Environ- ment	Aging Effect	Aging Mechanism	References
						-	
H2.5.3	Diesel Engine Fuel Oil Subsystem	Strainer	Cast iron	Diesel Fuel Oil	Loss of Material	General, Micro- biologically Influenced, Pitting, and Crevice Corrosion	ASIM D 270. ASIM D 975. ASIM D 2276.

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#### VII AUXILIARY SYSTEMS H2. EMERGENCY DIESEL GENERATOR SYSTEM

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Existing Aging Management Program (AMP)	Evaluation and Tec	nical Basis	Further Evaluation
	(continued from previous page) (10) Operating Experience: Surv tanks for a 20 years of operation degradation. The results of quar oil tank for a 15 years of operation content, biologics, and fungal lev acceptance criteria	eillance of diesel fuel oil has shown no aging terly sampling of a fuel n indicate that the water els were well below	
Same as the effects of General Corrosion on Items H2.5.1 day tank and H2.5.2 dip tank.	Same as the effects of General Co day tank and H2.5.2 dip tank.	rrosion on Items H2.5.1	Yes, Element 4 should be further evaluated

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### GALL REPORT – MECHANICAL DISCIPLINE COMMENTS SECTION VIIH.2

GALL	TITLE	ITEM NO.	PAGE	COMMENT
VII H2-1	Emergency Diesel Generator System	H.2.1.1	VII H2-4	Add general corrosion to the Aging Mechanism column.
VII H2-2	Emergency Diesel Generator System	H.2.1.1	VII H2-4	The program described in the Existing Aging Management Program (AMP) and the Evaluation and Technical Basis columns should be replaced with the Chemistry Program (Closed Cooling) provided. BASIS: The Chemistry Program (Closed Cooling) will manage loss of material due to general, crevice, and pitting corrosion. See write-up in Chapter XI.
VII H2-3	Emergency Diesel Generator System	H2.1.1	VII H2-6	Delete Item H.2.1 BASIS: Erosion-corrosion is not an aging mechanism applicable to this system. This system does not meet any of the criteria for erosion- corrosion to be a concern. As a result this system is not within the scope of the plant Flow Accelerated Corrosion Program. In addition, there is not operating experience showing that this is a concern.
VII H2-4	Emergency Diesel Generator System	H2.2.1 –5, & H2.3.1 –3	VII H2-9	The aging management programs described here are site specific maintenance activities instead of generic plant programs. We recommend revising the Existing Aging Management Program (AMP) and Evaluation and Technical Basis columns to reflect that these aging effects are managed by site specific activities.
VII H2-5	Emergency Diesel Generator System	H2.4.2	VII H2-10	Delete Item H2.4.2 BAIS: In exhaust gases, particulates in the gas are not traveling at the speed to erode the muffler surface. The exhaust gases are corrosive, but not erosive, therefore, the aging mechanism "Particulate Wear Erosion" is not applicable. In addition, the diesels are normally in standby and operated only for periodic testing which would make erosion insignificant if the gases were erosive.
VII H2-7	Emergency Diesel Generator System	H2.5.1, H2.5.2, & H2.5.2	VII H2-13	Replace the program described with the Fuel Oil Chemistry Program. BASIS: The program described is based on test methods delineated in the ASTM Standards. These are not plant programs. The plant program, typically the Chemistry Program, implements these standards for testing.

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# Liquid Waste Disposal System

- I.1 Piping
- I.2 Pumps
- I.3 Valves
- I.4 Tanks
- I.5 Evaporators
- I.6 Demineralizers
- I.7 Gas Strippers

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### L Liquid Waste Disposal System

#### System, Structures, and Components

The system, structures, and components included in this table comprise the liquid waste disposal system, which collects, monitors, and recycles or releases all potentially radioactive liquid wastes produced by boiling or pressurized water reactors in the U.S. The major components of this system are the piping, pumps, valves, tanks, evaporators, demineralizers, and gas strippers. All of these components are fabricated of austenitic stainless steel except for the piping, which may be carbon, low-alloy, or austenitic stainless steel. Based on U.S. Nuclear Regulatory Commission Regulatory Guide 1.26, "Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants," all components in the liquid waste disposal system are classified as Quality Standards Group D with the exception of the containment penetration piping out to the second isolation valve from the containment sump pump discharge, which is Quality Standards Group B.

Pumps and valves are considered to be active components; seats, discs, and other valve and pump internals should be covered by the plant maintenance program.

#### System Interfaces

The systems that interfaces with the liquid waste disposal system include the recirculating water cooling system (BWRs) or the steam generator blowdown subsystem (PWRs), as well as with other potential sources of liquid radioactive waste, including the auxiliary building equipment and floor drains, chemical and regeneration waste drains, turbine building equipment and floor drains, and the condensate polisher sump.

# VII AUXILIARY SYSTEMS I. LIQUID WASTE DISPOSAL SYSTEM

	Structure and	Region of		Environ-	Aging	Aging	
Item	Component	Interest	Material	ment	Effect	Mechanism	References
I. 1	Carbon and	OD surfaces	Carbon and	Air and (for	Local Loss of	Pitting	NRC IN 79-19.
	Low Alloy Steel Pining		Low-Alloy Steel	some plants	Material	Corrosion	
	oteer i iping			water		Corrosion	
				leakage at			
				00			
				Écternal			
				welting	$\backslash$		
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Plant specific aging management program activity reguind LIQUID WASTE DISPOSAL SYSTEM Further Existing Evaluation Evaluation and Technical Basis Aging Management Program (AMP) Yes. (1) Scope of Program: The program relies on monitoring Pitting correction and crevice correction and maintaining the chemistry conditions of the borated Elementso may occur in portions of the system in contact with borated water, such a water for managing the effects of pitting corrosion and through 6 should be crevice corrosion on the intended function of the external surfaces that experiency components. (2) Preventive Actions: Monitoring/and further intermittent wetting and evaporation. aluated maintaining the system chemistry conditions will help The AMPs to deal with this potential minimize the rate and effects of component degradation problem are detailed in the Plant by minimizing the impurities in the system fuid. The Technical Specifications and rely on AMP, however, is inadequate to manage the effects of minimizing impurities by monitoring pitting corrosion and crevice corrosion that may occur at and maintaining the borated water external surfaces that may experience intermittent chemistry conditions. The program wetting and evaporation, where impurities in borated contains chemical parameter water may concentrate over the years. Therefore, an specifications, sampling frequency. analysis, and corrective actions. inspection program should be implemented to ensure that pitting corrosion and crevice corrosion have not occurred. Chemical parameters and impurities (3) Parameters Monitored/ Inspected: The chemistry of the are sampled and monitored borated water is monitored and controlled to mitigate the periodically. Based on operating effects of pitting corrosion and crevice corrosion on the conditions, the sampling frequency ranges from daily, weekly, monthly, to intended function of the component. However, high concentrations of impurities at external surfaces that may quarterly. If the specified values are experience intermittent wetting and evaporation could expeeded, corrective actions are cause pitting and crevice oprrosion under crevice initiated to bring the chemistry conditions. Therefore, the AMP should include an parameters back to normal levels. inspection of aging effects at susceptible locations of the component to ensure pitting corrosion and crevice Plant specific aging corrosion are adequately managed. (4) Detection of Aging Effects: The existing AMP should include inspection Management program/ activity and/or testing samples of the component for timely detection of aging effects due to pitting corrosion and crevice corrosion/ Programs such as visual inspection and ultrasonic thickness measurement are effective methods to ensure that the effects of pitting corrosion and crevice corrosion have not occurred and the intended functions are maintained. (5) Monitoring and Trending: The results of the inspection should be used to dictate the frequency of future inspections. (6) Acceptance Criteria: Any degradation is evaluated in accordance with IWE-3100 or IWB-3100 by comparing ISI results with the acceptance standarys of IWE-3400 or IWB-3400. (7, 8 & 9) Corrective Actions, Confirmation Process and Administrative Controls: Site corrective actions program, QA procedures, site feview and approval process, and administrative controls are implemented in accordance with Appendix B to/10 CFR Part 50 requirements and will continue to be adequate for license renewal. (10) Operating Experience: Boric acid corrosion has not been reported in liquid waste lisposal system components, but several through-wall tracks at piping welds have been found in spent fuel coling systems (IN 79-19).

1.	Structure and	Region of		Environ-	Aging	Aging	
Item	Component	Interest	Material	ment	Effect	Mechanism	References
1.1	Carbon and	OD surfaces	Carbon and	Air and (for	Loss of	Correctory/	NRC GL 88-05.
	Low Alloy	-	Low-Alloy	some plants	Material	Boric Acid	ASME Section XI,
	Steel Piping	1	Steel	borated	,	Wastage at	1989 Edition.
				water		External	NRC IN 86-108 S3.
				leakage at		Surfaces	1
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# VII AUXILIARY SYSTEMS L LIQUID WASTE DISPOSAL SYSTEM

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See Chapter XI for an evaluation AUXILIARY SYSTEMS LIQUID WASTE DISPOSAL SYSTEM Further Existing Evaluation Evaluation and Technical Basis Aging Management Program (AMP) (1) Scope of Program: The stall guidance of Genenc Lette Implementation of NRC Centric cetter No (GL) 88-05 provides assurances that a program has been 88-05, and inservice inspection in implemented consisting of systematic measures to ensure conformance with ASME Section XI (edition specified in 10 CFR 50.55a). that the effects of corrosion caused by leaking coolant Subsection IWE, Table IWE 2500-1 (or Subsection IWC, Table IWC 2500-1 for containing boric acid does not lead to degradation and provides assurance that the reactor components will have a extremely low probability of abnormal leakage, rapidly Onality Group B piping). propagating failure, or gross rupture. The program Boric Adid Comosim includes (a) determination of principal location. (b) examinations requirements and procedures for locating small leaks, and (c) engineering evaluations and Program corrective actions. (2) Preventive Actions: Minimizing reactor coolant leakage by frequent/monitoring of the locations where potential leakage could occur and repairing the leaky components as soon as possible, prevent or mitigate boric acid porrosion. (3) Parameters Monitored/Inspected: The AMP monitors the effects of boric acid corrosion on the intended function of the component by detection of coolant leakage by inservice inspection (ISI). (4) Detection of Aging Effects: Degradation of the component due to boric acid wastage can not occur without leakage of coolant containing boric acid; extent and schedule of inspection assure detection of leakage before the loss of intended function of the component. (5) Monitoring and Trending: Inspection schedule of ASME Section XI should provide for timely detection of leakage. System hydrostatic test is conducted at or near the end of each inspection interval. (6) Acceptance Criteria: Any relevant conditions that may be detected during the leakage and hydrostatic tests are evaluated in accordance with ASME Section XI requirements. (7) Corrective Actions: Repair and replacement is in conformance with ASME Section XI requirements. (8 & 9) Confirmation Process and Administrative Controls: Site QA procedures, review and approval processes, and administrative controls are implemented in accordance with requirements of Appendix B to 10 CFR Part 50 and will continue to be adequate for the period of license renewal. (10) Operating Experience: Boric acid wastage observed in nuclear power plants may be classified into two distinct types: (a) corrosion that increases the rate of leakage, e.g., rosion of closure bolting or fasteners in reactor coolant essure boundary, and (b) corrosion that occurs some distance from the source of leakage. Some recent incidents of boric acid wastage (IN 86-108 S3) at Calvert Cliffs Unit 1 (Feb. 1994) and Three Mile Island Unit 1 (March 1994) indicate that, although implementation of GL 88-05 ensures timely detection of leakage, there may still be a lack of awareness of the conditions that can lead to boric acid wastage Plant Specific Aging Management Plant specific sqing Monseyement Program / Activities program / activity required

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# VII AUXILIARY SYSTEMS L LIQUID WASTE DISPOSAL SYSTEM

	<u> </u>	1.2.12 2131 032	LSISICM				
Item	Structure and Component	Region of Interest	Material	Environ-	Aging	Aging	Deferences
1.1	Carbon and	ID surfaces	Carbon and	Romated	Taral Lass of	Dintia	References
	Low Allov	in surraces	Law Allow	Boraleu	Local Loss of	Pitting	
	Steel Pining		Etwol	waste water	Material	Corrosion	
	Steer Fiping		DIEEL	lor some		and Crevice	1
				plants) with		Corrosion	
				various	1		
1				impurities			
1	-			at ID.		1	
				including			
				possible			
				chlorides			
1				particularly			
1			1	in plants			
1				located near			
				the ocean			
I.1	Carbon and	ID surfaces	Carbon and	Borated	Loss of	Corresion/	
	Low Allov	1	Low-Allov	waste water	Material	Boric Acid	
1	Steel Piping	1	Steel	for some		Wastage at	
1				plants) with		Internal	
				various		Surfaces	
			1	mourities		Ounicus	
				at ID.			
				including			
		•		possible			
				chlorides			
			ł	oarticularly			
				in plants			
1				ni plants			
				the ocean			
1.1	Stainless	OD surfaces	Stainless	Air and (for	Crack	Stress	ASME Section VI
	Steel Piping		Steel	some plants	Initiation	Corresion	1989 Edition
				borated	and Growth	Cracking	Perulatory Guide
				water		(SCC)	1 44
				leakade at		SCC)	1.44.
	(A			Casage at	1		
	Delei						
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#### VII AUXILIARY SYSTEMS

## L LIQUID WASTE DISPOSAL SYSTEM

Existing		Further
Aging Management Program (AMP)	Evaluation and Technical Basis	Evaluation
Plant-specific aging management program.	Plant-specific aging management program will be evaluated.	Yes. No generic AMP
Plant-specific aging management program.	Plant-specific aging management program will be evaluated.	Yes. No generic AMP
Suidelines of Regulatory Guide (RG) 1.44 to avoid sensitization of stainless steels (SSs) and control water chemistry and inservice inspection in conformance with ASME Section XI (edition specified in 10 CFR 50.55a) Subsection IWE, Table IWE 2500-1, (or Subsection IWC, Table IWC 2000-1 for Quality Group B piping) for pressure retaining welds in austenitic stainless steel and high alloy piping.	(1) Scope of Program: The program includes preventive neasures to mitigate SCC of SS components, and inservice inspection (ISI) to monitor the effects of SCC on the intended function of piping and fittings and connected lines. (2) Preventive Actions: Selection of material in compliance with the requirements of Regulatory Guide (RG) 1.44 prevent or mitigate SCC. Also, control of halogens and oxygen in the water during operation mitigate the potential for SCC, though introduction and concentration of impurities at external surfaces, particularly in crevices, is still possible. (3) Parameters Monitored/Inspected: The parameters monitored are concentrations of impurities in the containment spray system to reduce the potential for stress corrosion cracking at the weld heat-affected zones. Periodic surface and volumetric inspections are required for Class 2 piping webs. Requirements for training and qualification of personnel and performance demonstration for procedures and equipment is in conformance with Appendices VII and VIII of ASME Section XI, or any other formal program approved by the NRC. (4) Detection of Aging Effects: Degradation of the piping due to SCC can not occur without crack initiation and growth. ASME Section XI inspection requires examination of only the welds and weld regions, but SCC is not expected to propagate into the base metal beyond the HAZ.	No

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# VII AUXILIARY SYSTEMS

# I. LIQUID WASTE DISPOSAL SYSTEM

Item	Structure and Component	Region of Interest	Material	Environ- ment	Aging Effect	Aging Mechanism	References
						-	·
I. 1	Stainless Steel Piping	ID surfaces	Stainless Steel	Borated waste water (for some plants) with various impurities at ID, including possible chlorides particularly in plants located near the ocean	Crack Initiation and Growth	Stress Corrosion Cracking (SCC)	ASME Section XI. 1989 Edition. Regulatory Guide 1.44.

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# AUXILIARY SYSTEMS

LIQUID WASTE DISPOSAL SYSTEM T. Further Existing Evaluation and Technical Basis Evaluation Aging Management Program (AMP) continued from previous page) () Monitoring and Trending: Inspection schedule in accordance with IWE-2400 should provides timely detection of cracks. (6) Acceptance Criteria: Apy IGSCC degradation is evaluated in accordance with WE-3100 by comparing ISN results with the acceptance standards of IWE-3400. (7) Corrective Actions: Repair and replacement are in conformance with IWA-4009, and reexamination in accordance with requirements of TWA-2200. (8 & 9) Confirmation Process and Administrative Controls: Site QA procedures, review and approval processes, and administrative controls are implemented in accordance with requirements of Appendix B to 10 CFR Part 50 and will continue to be adequate for the period of license renewal. (10) Operating Experience: Piping in the containment spray system of PWRs has generally not been found to be affected by SCC because of control diwater chemistry, significant potential of SCC exists from inadvertent introduction of impurities resulting from contact with the piping external surfaces. (1) Scope of Program: The program includes preven (s of Regulatory Cuide (RC) | Guidelid measures to mitigate SCC of SS components, and inserv to avoid sensitization of stainless seeis inspection (ISI) to monitor the effects of SCC on the (SSs) and control water chemistry and intended function of piping and fittings and connected inservice inspection in conformance lines. (2) Preventive Actions: Selection of material in with ASME Section XI tedition specified compliance with the requirements of Regulatory Guide in 10 CFR 50.55a) Subsection IWE, (RG) 1.44 prevent or mitigate SCC. Also, control of Table IWE 2500-1, (or Subsection IWC, halogens and oxygen in the water during operation Table IWC 2500-1 for Quality Group B mitigate the potential for SCC, though introduction and piping for pressure retaining welds in concentration of impurities in the waste streams is still ay stenitic stainless steel and high alloy possible. (3) Parameters Monitored/Inspected: The biping. parameters monitored are concentrations of impurities in the containment spray system to reduce the potential for Primary Water stress corrosion cracking at the weld heat-affected zones. Periodic surface and volumetric inspections are required Chemistry for Class 2 piping welds, Requirements for training and qualification of personnel and performance demonstration for procedures and equipment is in conformance with Appendices VII and VIII of ASME Section XI, or any other formal program approved by the NRC. (4) Detection of Aging Effects: Degradation of the piping due to SCC can not occur without crack initiation and growth ASME Section XI inspection requires examination of only the welds and weld regions, but SCC is not expected to propagate into the base metal beyond the HAZ. (5 Monitoring and Trending: Inspection schedule in accordance with IWE-2400 or IWB-2400 should provides timely detection of cracks. (6) Acceptance Criteria: Any IGS/C degradation is evaluated in accordance with IWE-3100 or IWB-3100 by comparing ISI results with the ageptance standards of IWE-3400 or IWB-3400. (f) Corrective Actions: Repair and replacement are in onformance with IWA-See Chapter XI Foran Evaluation of the Primary Water Chemistry program VII 1-1+1 DRAFT - 12/06/99

# VII AUXILIARY SYSTEMS L LIQUID WASTE DISPOSAL SYSTEM

			1001012001					
Item	Structure and	Region of	Material	Environ-	Aging	Aging		
	Component	merest	Material	ment	Ellect	Mechanism	References	
					1			
			1					
						•		
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			1					
<b>(</b> <sup>1.2</sup> )	Pumps,	OD surfaces	Stainless	Aur and (for	Crack	Stress	ASME Section XI	┥
M	notet		Steel	some plants	Initiation	Corrosion	1989 Edition.	
	There			borated	and Growth	Cracking	Regulatory Guide	
	1 cm	>		water		ISCC)	1.44.	ļ
	174	0		leakage at		· <del> </del>		
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1.2	Pumps	ID surfaces	Stainless	Borated	Crack	Stress	ASME Section XI.	٦
		İ	Steel	waste water	Initiation	Corrosion	1989 Edition,	
1				lor some	and Growth	Cracking	Regulatory Guide	
				plants) with		(SCC)	1.44.	1
				various				
				at ID				
				including				ł
				possible				
				chlorides	[			
				particularly				
				in plants				
			1	located near	1			
b				the ocean				
1.3	Valves	OD surfaces	Stainless	Air and (for	Crack	Stress	ASME Section XI.	1
$\sim$	17.10		Steel	some plants)	Initiation	Corrosion	1989 Edition,	I
1	~ Deleve			borated	and Growth	Craeking	Regulatory Guide	
				water 🦟		(SCC)	1.44.	
[			1	eakage at	$\sim$			
13	Values	ID surf.		22		•		╀
1.5	valves	in surfaces	ptainiess	Borated	Crack	Stress	ASME Section XI,	
l			DIGET	waste water	Initiation	Corrosion	1989 Edition,	
$\land$	$\sim$ 1		1	nor some	and Growth	Cracking	Regulatory Guide	
$  \bigvee v$				various) with		(SCC)	1.44.	
イン	F.45		1	mourities				L
/\ <sup>`</sup>	ビロー		1	at ID.				
Y Y	Le)			Including				
				possible				
				chlorides in				ł
	] ]			plants				
				located near				
	L			the ocean				ĺ
¶.4 )	Tanks	OD surfaces	Stainless	Air and (for	Crack	Stress	ASME Section XL	
$\checkmark$			Steel	some plants]	Initiation	Corrosion	1989 Edition,	
1	1.0			porated	and Growth	Cracking	Regulatory Guide	
	per 1			water		(Sec)	1.44.	
-	+			eakage at		Т		
	1 1			ມ			-	

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VII AUXILIARY SYSTEMS

#### I. LIQUID WASTE DISPOSAL SYSTEM

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1	Evicting		Further
	Aging Management Program (AMP)	Evaluation and Technical Basis	Evaluation
	Same as effects of Stress Corrosion	(continued from previous page) 4000, and reexamination in accordance with requirements of IWA-2200. (8 & 9) Confirmation Process and Administrative Controls: Site QA procedures, review and approval processes, and administrative controls are implemented in accordance with requirements of Appendix B to 10 CFR Part 50 and will continue to be adequate for the period of license renewal. (10) Operating Experience: Piping in the containment spray system of PWRs has generally not been found to be affected by SCC because of control of water chemistry. Same as effects of Stress Corrosion Cracking on Item 1.1:	No
	Cracking on Item I.1: Piping (OD):	Piping (OD).	
	Same as effects of Stress Corrosion Cracking on Item I.1: Piping (ID).	Same as effects of Stress Corrosion Cracking on Item I.1: Piping (ID).	No
$\left.\right\rangle$	Same as effects of Stress Corrosion Cracking on Item I. <del>1: Stainless Steel</del> Piping (OD).	Same as effects of Stress Corrosion Cracking on Item I.1: Piping (OD).	No
	Same as effects of Stress Corrosion Cracking on Item I.1: Stainless Steel Piping (ID).	Same as effects of Stress Corrosion Cracking on Item I.1: Piping (ID).	No
	Same as effects of Stress Corrosion Cracking on Item I.1: Stainless Steel Riping (OD).	Same as effects of Stress Corrosion Cracking on Item I.1: Piping (OD).	No
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#### VII AUXILIARY SYSTEMS L LIQUID WASTE I

# LIQUID WASTE DISPOSAL SYSTEM

		Structure and	Boging of	1		1			
	Item	Component	Interest	Material	Environ-	Aging	Aging		
i	14	Tanke	ID ourforce	Materiai	ment	Ellect	Mechanism	References	
	***	ranks	in surfaces	Stainless	Borated	Crack	Stress	ASME Section XI,	
				Piteel	waste water	Initiation	Corrosion	1989 Edition,	į
1			1		for some	and Growth	Cracking	Regulatory Guide	1
					plants) with	1	(SCC)	1.44.	
					various				
					impurities				I
					at ID,	· ·	1		
					including				
			1		possible		f		I
					chlorides				ł
					particularly	7			
					in plants	1			ł
				1	located near	-			l
	6			1	the ocean				I
Λ	1.5	Evaporators	OD surfaces	Stainless	Air and (for	Crack	Stress	ASME Section XI	
Х				Steel	some plants	Initiation	Corresion	1999 Faition	l
/					Dorated	and Growth	Cracking	Regulatory Guide	
1					water		USCC)	1 AA	l
			T		leakage at			*****	ł
					OD				l
ſ	I.5	Evaporators	ID surfaces	Stainless	Borated	Crack	Stress	ASME Section VI	
		-		Steel	waste water	Initiation	Corrosion	1980 Edition	
	•				for some	and Growth	Cracking	Pegulatory Cuide	
١٧					plants) with		(SCC)	1 AA	
N					various		(000)	1.11.	
ſ	$\backslash$				impurities				
		>+1-			at ID.				
		> blato			including		•		
					possible				
					chlorides				
			Γ, I		particularly				
					in plants				
		17-4			located near				
Ь	&	1			the ocean		}		
Æ	1.6	Deminera-	OD surfaces	Stainless	Air and (for	Crack	Streen	ACIAE Contine M	
(		lizers		Steel	some plants	Initiation	Corrocion	ASIVIE Section AL	
+					borated	and Growth	Cracking	1969 Edition,	
					water	and Growth	Clacking ISCO	LAA	
					leakage at			1.44	
					OD				
h	1.6	Deminera-	ID surfaces	Stainless	Borated	Crack	Strees	ACINE CANHAR DE	
1	-	lizers		Steel	waste water	Initiation	Corrector	1080 Edition	
			1	J LOCI	for some	and Growth	Contraction	1969 Edition,	
	1				nlante) with	and Growin	(SCO)	Regulatory Guide	
					various		(SCC)	1.44.	
	1				mnurities		. I		
			ļ		at ID	1	1		
ł				1	including		1		
	1			1	Dossible	1		1	
	1		4	ľ	possible			f	
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## VII AUXILIARY SYSTEMS

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## I. LIQUID WASTE DISPOSAL SYSTEM

Fristing		Further
Aging Management Program (AMP)	Evaluation and Technical Basis	Evaluation
Same as effects of Stress Corrosion Cracking on Item I.1: Stainless Steel Piping (ID).	Same as effects of Stress Corrosion Cracking on Item I.1: Piping (ID).	No
Some as effects of Stress Corrosion	Same as effects of Stress Corrosion Cracking on Item 1.1:	No
Cracking on Item I.1: Stainless Steel	Piping (OD).	
Piping (OD).		
Same as effects of Stress Corrosion Cracking on Item I.1: Stainless Steel Piping (ID).	Same as effects of Stress Corrosion Cracking on Item I.1: Piping (ID).	No
	E THE	
Some as effects of Stress Corrosion	Same as effects of Stress Oprrosion Cracking on Item I.1:	No
Cracking on item 1.1: Submess Steel		
Same as effects of Stress Corrosion Cracking on Item I.1: Stainless Steel Piping (ID).	Same as effects of Stress Corrosion Cracking on Item I.1: Piping (ID).	No

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VII .	II AUXILIARY SYSTEMS							
	L LIQUID W	ASTE DISPOSA	L SYSTEM					
Item	Structure and Component	Region of Interest	Material	Environ- ment	Aging Effect	Aging Mechanism	References	
5	tele ->		Starl	Air and (for some plants borated water leakage at OD	Crack Initiation and Growth	Stress Correction Cracking (SCC)	ASME Section XI, 1989 Edition, Regulatory Guide 1.44.	
1.7	Gas Stripp <del>e</del> rs	ID surfaces	Stainless Steel	Borated waste water (for some plants) with various impurities at ID, including possible chlorides particularly in plants located near the ocean	Crack Initiation and Growth	Stress Corrosion Cracking (SCC)	ASME Section XI, 1989 Edition, Regulatory Guide 1.44.	

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VII AUXILIARY SYSTEMS I. LIQUID WASTE DISPOSA	L SYSTEM	
Existing Aging Management Program (AMP)	Evaluation and Technical Basis	Further Evaluation
Sa <del>me as effects of Stress Corrosion</del> Cracking on Item I <del>:1: Stainless</del> Steel Piping (OD).	Same as effects of Stress Corrosion Cracking on Item I.1: Piping (OD).	No
Same as effects of Stress Corrosion Cracking on Item I.1: Stainless Steel Piping (ID).	Same as effects of Stress Corrosion Cracking on Item I.1: Piping (ID).	No

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# GALL REPORT – MECHANICAL DISCIPLINE COMMENTS SECTION VII I

GALL	TITLE	ITEM NO.	PAGE	COMMENT
VII I-1	Liquid Waste Disposal System	I.1	VII I-4, & 8	External wetting could also be from treated and raw water systems. These need to be added to the Environment column
VII I-2	Liquid Waste Disposal System	I.1	VII 1-5, & 9	The Exiting Aging management column suggests that loss of material due to pitting corrosion and crevice corrosion could be managed by a chemistry program. We do not believe this is valid. BASIS: Once water leaves a system, the chemistry program no longer applies. Another program or a site-specific program needs to be presented to manage external aging.
VII I-3	Liquid Waste Disposal System	I.1	VII I-7	The program described here is a mixture of two programs. To manage loss of material due to boric acid wastage, the program described here needs to be replaced with the Boric Acid Corrosion Program description that has been provided. This is the only program required to manage boric acid wastage of carbon steel component external surfaces. In addition, another program or site specific activities need to be described here to manage loss of material due to general corrosion of external surfaces or general corrosion needs to be deleted from the Aging Mechanisms column.
VII I-4	Liquid Waste Disposal System	I.1, I.2, I.3, I.4, I.5, I.6, & I.7 on external surfaces	VII I-8 through 17	Delete Items I.1, I.2, I.3, I.4, I.5, I.6 and I.7 BASIS: Stainless steel is not susceptible to stress corrosion cracking when exposed to ambient air. Also, cracking of stainless steel external surfaces due to leakage from the system assumes a failure to identify an aging effect. Except for boric acid wastage of external surfaces, licensees don't assume a failure to identify an aging effect.
VII I-5	Liquid Waste Disposal System	I.1, I.2, I.3, I.4, I.5, I.6, & I.7	VII I-11, 13, 15, & 17	Replace the wording in the Existing Aging management Program and Evaluation and Technical Basis columns with a reference to the Primary Water chemistry program. BASIS: To manage stress corrosion cracking, all that is needed is the Chemistry Program (Primary).

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