

ACRS FULL COMMITTEE MEETING UPDATED LICENSE RENEWAL GUIDANCE DOCUMENTS

Division of License Renewal, NRR

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NRR/DLR/Aging Management Reactor Systems and
Guidance Updates (RARB)

License Renewal Guidance Document Update Presentation - Agenda



- Background (Bob Gramm/NRR)
- Overview of general changes to license renewal guidance documents
- Major changes to electrical aging management programs (Matt McConnell and Cliff Doult/NRR)
- Major changes to structural aging management programs
- Major changes to mechanical aging management programs
 - One Time Inspections of Small Bore Piping (Allen Hiser/NRR)
 - PWR Internals (Barry Elliot/NRR)
 - Buried Pipe (Dave Alley/NRR)
- Summary

Level of Effort

- Involvement of over 90 staff/managers
 - NRR Div. Of License Renewal, NRR technical divisions, RES, regional staff, and contractors
- NRC expert panels
- Interaction with external stakeholders (industry and public)
 - NEI suggested changes (2009)
 - Public workshops (January and May 2010)
 - Formal external stakeholder comments (2010)
 - Buried pipe public meetings (2010)

General Changes to License Renewal Guidance Documents



- Focus on AMP content
- Update AMPs for recent operating experience and reference documents
 - Domestic and foreign operating experience reviews (2004-2009)
- Update AMPs to reflect precedents from recent LR applications/SERs
- Update AMPs to capture Interim Staff Guidance
- Consolidated GALL Report into a single volume
- Revised SRP-LR 10 Element Template for AMPs and updated AMPs

General Changes to License Renewal Guidance Documents - continued



- Revised GALL for application of the ASME Code
 - AMPs are based on the 2004 Edition of the Code; other editions and addenda are allowed
 - Clarified use of Code Cases and Relief Requests
- Revised GALL to provide guidance on the use of later revisions of industry documents
- Eliminated "further evaluation" as appropriate
 - Based on augmentation of AMP content and/or better understanding of operating experience
- Eliminated AMP content not related to aging

AMP XI.E3, Inaccessible Power Cables not Subject to 10 CFR 50.49 EQ Requirements

Significant changes to XI.E3 are based on plant specific and industry operating experience (IN 2002-12), responses to the GL 2007-01, LR inspections and audits, and Division of Engineering and Office of Research input and include:

- *Scope of Work*
 - revised to include all inaccessible or underground power cables greater than or equal to 400 Volts (typically 480 V) within the scope of license renewal subjected to significant moisture
 - revised to include energized and de-energized cables
- *Detection of Aging Effects*
 - revised cable testing frequency not to exceed 6 years
 - revised inspection frequency of water collection is based on plant-specific operating experience, but not to exceed one year
 - event driven water accumulation inspections - such as rain or flood.

Other Electrical AMP Changes



- XI.E1 (insulation material not subject to EQ) – Removed references to sampling - all accessible cables in adverse localized environments will be inspected
- XI.E6 (cable connections not subject to EQ) - Incorporated Final License Renewal Interim Staff Guidance LR-ISG-2007-02, which provides for one-time testing

Changes to Structural AMPs

- Relocation of high strength structural bolting provisions
- XI.S1 (IWE) - incorporate interim staff guidance (LR-ISG-2006-01) related to monitoring the MK1 drywell corrosion
- XI.S2 (IWL) - revised to include additional tendon monitoring when containment cutout made
- XI.S5 (masonry walls)- revised inspection frequency
- XI.S6 (structures monitoring) – revised inspection frequency
- XI.S8 (containment coatings) Clarified importance of coating assessments and inclusion of coatings on concrete; revised reference to RG 1.54, Revision 2

AMP XI.M35, One-Time Inspection of ASME Code Class 1 Small Bore Piping

- *Program Description:*
 - Socket welds are included
 - Program applicability
 - Cracking has not occurred
 - Cracking due to high cycle fatigue has been mitigated
 - Plant specific program required for other cases
- *Detection of Aging Effects:*
 - Socket Welds
 - Volumetric exam (VE) or destructive exams (DE)
 - Full penetration welds
 - Volumetric exams
 - Volumetric exams performed using demonstrated techniques
 - ASME Code qualification not required

AMP XI.M35, One-Time Inspection of ASME Code Class 1 Small Bore Piping - continued



Failures			No Failures
High cycle fatigue-mitigated	High cycle fatigue – not mitigated	Stress corrosion cracking or thermal fatigue	More than 30 years
10% of welds; max. of 25 welds of each type	Plant-specific periodic program	Plant-specific periodic program	≥ 3% of welds; max. of 10 welds of each type
OTI within 6 years before PEO			OTI within 6 years before PEO
1 DE = 2 VE			1 DE = 2 VE

AMP XI.M16A, PWR Vessel Internals



- AMP is based on guidelines for examination of vessel internals in EPRI report, “Materials Reliability Program (MRP): Pressurized Water Reactor Internals Inspection and Evaluation Guidelines (MRP-227-Rev. 0)” and “MRP: Inspection Standard for PWR Internals (MRP-228)”
- MRP-227-Rev.0 is currently being reviewed by the NRC staff

AMP XI.M16A, PWR Vessel Internals - continued



- GALL 2005 did not contain a generic AMP for PWR vessel internals:
 - GALL 2005 recommended applicants to commit to participate, evaluate and implement an industry program for vessel internals and to provide an inspection plan no less than 24 months before entering the period of extended operation
 - GALL 2010 recommends applicants submit an inspection plan for vessel internals to the NRC for review and approval with the application for license renewal

AMP XI.M16A, PWR Vessel Internals - continued



- MRP submitted proposed AMR line items for Westinghouse, Combustion Engineering, and Babcock and Wilcox designed vessel internals, based on MRP-227-Rev.0
- NRC staff modifications to the proposed MRP AMR line items:
 - Each component that is classified as a primary component, expansion component, or an existing program component in accordance with MRP-227-Rev.0 is included in GALL
 - Cross reference primary and expansion component in accordance with MRP-227-Rev.0
 - Further evaluation for (a) inaccessible locations, (b) plant-specific programs that are not included in MRP-227, (c) TLAA for reduction in ductility and fracture toughness due to neutron irradiation for Babcock & Wilcox reactor vessel internals

AMP XI.M41

Buried and Underground Piping and Tanks

Objective

- Managing aging of buried and underground piping and tanks
 - Primary issue is external corrosion

Buried Pipe

Definitions

- Buried
 - In direct contact with soil or concrete
- Underground
 - Below grade
 - Limited access
 - In contact with air
 - e.g. pipes in trenches or vaults

Buried Pipe - continued

Philosophy

- Preventive actions are the best approach to aging management
 - Some inspections still required
 - More inspections required if prevention is less than perfect

Buried Pipe - continued

Philosophy – continued

- Concentrate on high “risk” pipe
 - Higher probability of corrosion
 - Higher consequences of “failure”
 - Code Class or safety related
 - Hazmat
 - Radiation, diesel fuel etc.

Buried Pipe - continued

Philosophy – continued

- Preventive actions/inspections based on “failure”
 - Code class/safety related
 - Must have sufficient water flow
 - Hazmat
 - Must not contaminate groundwater

Buried Pipe - continued

Philosophy – continued

- Excavations can damage pipe
 - Permit alternatives to excavations whenever possible
 - Hydrotests
 - Internal inspections
 - Monitor active equipment (jockey pumps)

Buried Pipe - continued

Preventative Actions

- Based on material of construction
- Recommendations concerning
 - Coating
 - Backfill
 - Cathodic protection

Buried Pipe - continued

Preventative Actions - continued

Material ¹	Coating ²	Cathodic Protection ⁴	Backfill Quality
Titanium			
Super Austenitic Stainless ⁸			
Stainless Steel	X ³		X ^{5, 7}
Steel	X	X	X ⁵
Copper	X	X	X ⁵
Aluminum	X	X	X ⁵
Cementitious or Concrete	X ³		X ^{5, 7}
Polymer			X ⁶

Buried Pipe - continued

Inspections

- Apply to
 - Code Class/safety related
 - Hazmat
- Designed to accommodate
 - Various levels of prevention in first inspection (yrs 30-40)
- Expect
 - Good prevention in remaining inspections

Buried Pipe - continued

Inspections - continued

Material ¹	Preventive Actions ²	Inspections ³	
		Code Class Safety Related ⁴	Hazmat ⁵
Titanium			
Super Austenitic Stainless ⁷			
Stainless Steel		1 ⁶	1 ⁶
HDPE ⁸	A	1 ⁶	1 ⁶
	B	2	1%
Other Polymer ⁹	A	1 ⁶	1 ⁶
	B	2	1%
Cementitious or Concrete		1 ⁶	1 ⁶
Steel	C	1 ⁶	1 ⁶
	D	1	2%
	E	4	5%
	F	8	10%
Copper	C	1 ⁶	1 ⁶
	D	1	1%
	E	1	2%
	F	2	5%
Aluminum	C	1 ⁶	1 ⁶
	D	1	2%
	E	1	5%
	F	2	10%

Buried Pipe - continued

Inspections - continued

Material ¹	Preventive Actions ²	Inspections ³	
		Code Class Safety Related ⁴	Hazmat ⁵
Steel	C D E F	1 ⁶ 1 4 8	1 ⁶ 2% 5% 10%

Buried Pipe - continued

Inspections - continued

- Alternatives
 - Fire mains
 - Annual flow tests
 - Monitor jockey pump activity
 - All pipe
 - Hydrostatic tests
 - Internal inspections

Buried Pipe - continued

Summary

- Intent is to manage aging
 - Best accomplished through preventive actions
- Intent is to be consistent with management of other buried pipe
 - NACE external corrosion control standard

Buried Pipe - continued

Summary - continued

- Concentrate on important piping
 - Code Class/safety related
 - Hazmat
- Inspections necessary
 - Level depends on material and prevention

License Renewal Guidance Document Update: Summary



- Enhancements made to the GALL Report and SRP-LR will improve their usefulness
- Guidance documents will provide appropriate framework for applicants to develop programs that will continue to provide reasonable assurance to manage aging effects
- Requested waiver of CRGR review pending