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**Docket:** NRC-2015-0159

Changes to Buried and Underground Piping and Tank Recommendations

**Comment On:** NRC-2015-0159-0001

Changes to Buried and Underground Piping and Tank Recommendations; Draft License Renewal Interim Staff Guidance

**Document:** NRC-2015-0159-DRAFT-0002

Comment on FR Doc # 2015-15919

6/29/2015  
 80FR37028

## Submitter Information

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## General Comment

August 6, 2015

Ms. Cindy K. Bladey  
 Chief, Rules, Announcements, and Directives Branch (RADB)  
 Office of Administration  
 U.S. Nuclear Regulatory Commission  
 Washington, DC 20555-0001

Subject: Industry Comments to Draft License Renewal Interim Staff Guidance LR-ISG-2015-01, Changes to Buried and Underground Piping and Tank Recommendations (Docket ID NRC20150159)

Project Number: 689

Dear Ms. Bladey:

On behalf of the nuclear energy industry, the Nuclear Energy Institute (NEI) appreciates the opportunity to

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 Template = AD14-013

provide comments on Draft License Renewal Interim Staff Guidance LR-ISG-2015-01 Changes to Buried and Underground Piping and Tank Recommendations (Docket ID NRC20150159).

The purpose of the Draft ISG is to replace aging management program (AMP) XI.M41, Buried and Underground Piping and Tanks, and its associated Updated Final Safety Analysis Report (UFSAR) Summary Description in LR-ISG-2011-03, Changes to the Generic Aging Lessons Learned (GALL) Report Revision 2 Aging Management Program (AMP) XI.M41, Buried and Underground Piping and Tanks. These changes address new recommendations related to buried and underground piping and tanks within the scope of the NRC's regulations for the renewal of operating licenses for nuclear power plants.

We agree with many of the revisions incorporated by this ISG. The revisions are based on industry operating experience and lessons learned consistent with the NEI 09-14 industry initiative for management of underground piping and tank integrity. The revisions provide flexibility for aging management of underground piping and tanks, incorporation of applicable program improvements, and consideration of applicable industry operating experience.

Attached are specific industry comments and recommended changes based on our review of Draft LR-ISG-2015-01. We appreciate your consideration of these comments.

If you have any questions, please contact either me or Jerud Hanson (202-739-8053; jeh@nei.org).

Sincerely,

S. Jason Remer  
Director, Plant Life Extension

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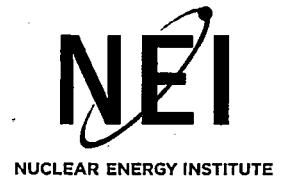
## Attachments

08-06-15\_NRC\_Industry Comments to Draft License Renewal Interim Staff Guidance LR-ISG-2015-01, Changes to Buried and Underground Piping and Tank Recommendations

08-06-15\_NRC\_Industry Comments to Draft License Renewal Interim Staff Guidance LR-ISG-2015-01, Changes to Buried and Underground Piping and Tank Recommendations\_Attachment

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August 6, 2015

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Dear Ms. Bladey:

On behalf of the nuclear energy industry, the Nuclear Energy Institute (NEI)<sup>1</sup> appreciates the opportunity to provide comments on Draft License Renewal Interim Staff Guidance LR-ISG-2015-01 "Changes to Buried and Underground Piping and Tank Recommendations" (Docket ID NRC-2015-0159).

The purpose of the Draft ISG is to replace aging management program (AMP) XI.M41, "Buried and Underground Piping and Tanks," and its associated Updated Final Safety Analysis Report (UFSAR) Summary Description in LR-ISG-2011-03, "Changes to the Generic Aging Lessons Learned (GALL) Report Revision 2 Aging Management Program (AMP) XI.M41, Buried and Underground Piping and Tanks." These changes address new recommendations related to buried and underground piping and tanks within the scope of the NRC's regulations for the renewal of operating licenses for nuclear power plants.

We agree with many of the revisions incorporated by this ISG. The revisions are based on industry operating experience and lessons learned consistent with the NEI 09-14 industry initiative for management of underground piping and tank integrity. The revisions provide flexibility for aging management of

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<sup>1</sup> The Nuclear Energy Institute (NEI) is the organization responsible for establishing unified industry policy on matters affecting the nuclear energy industry, including the regulatory aspects of generic operational and technical issues. NEI's members include all entities licensed to operate commercial nuclear power plants in the United States, nuclear plant designers, major architect/engineering firms, fuel cycle facilities, nuclear materials licensees, and other organizations and entities involved in the nuclear energy industry.

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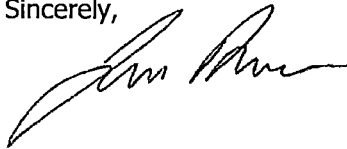
Ms. Cindy K. Bladey  
August 6, 2015  
Page 2

underground piping and tanks, incorporation of applicable program improvements, and consideration of applicable industry operating experience.

Attached are specific industry comments and recommended changes based on our review of Draft LR-ISG-2015-01. We appreciate your consideration of these comments.

If you have any questions, please contact either me or Jerud Hanson (202-739-8053; jeh@nei.org).

Sincerely,

A handwritten signature in black ink, appearing to read "Jason Remer", written in a cursive style.

Jason Remer

Attachment

c: Mr. Christopher G. Miller, NRR/DLR/RSRG, NRC  
Mr. Steven D. Bloom, NRR/DLR/RSRG, NRC

## NEI License Renewal Mechanical Working Group

## LR-ISG-2015-01 Industry Comments Matrix

Section/ Page Reference	Comment	Suggested Wording/Revision
N/A	N/A	Note to Reviewer:  In order to ensure clarification in wording/revisions, the <u>underline</u> feature of MS Word has been used throughout this section of the comments to indicate industry's recommended wording revisions or additions.
P1 / Discussion	Editorial – Incorrect comma usage in initial sentence.	Based on industry operating experience and the staff's review of LRAs and plant-specific buried and underground piping and tanks inspection reports since issuance of AMP XI.M41, the staff has determined that the GALL Report and SRP-LR should be revised to reflect new recommendations associated with AMP XI.M41.
Introduction, page 1  Discussion "Description of Changes", page 5	Neither the introduction nor the discussion mentions that AMP XI.M33 is also modified by the ISG, yet changes are included as Appendix C. The discussion of selective leaching inspections on page 5 says that the recommendations in AMP XI.M41 have been moved to AMP XI.M33 with no technical changes. However, this is in the context of the changes to AMP XI.M41 and the description does not make it clear that the changes to AMP XI.M33 are provided in this ISG.	The introduction should be revised to indicate that changes to AMP XI.M33 are also included in the ISG. The discussion of selective leaching on page 5 could also be revised to refer to Appendix C for the changes to AMP XI.M33.
Discussion "Description of Changes", page 2  Appendix B "Preventive Actions", page B-2	Page 2 states that the maximum negative 1200 mv CP criterion was relocated from the "acceptance criteria" program element to a recommendation within the "preventive actions" program element, to allow licensees flexibility in balancing the performance of their CP systems. Page 2 describes this upper limit as a "recommendation." The new	In addition to moving from one program element to another, it may be beneficial to refer to the 1200 mV criterion as a recommendation, such as <u>it is recommended that the limiting critical potential should not be more negative than -1200 mV.</u>

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	description in the "preventive actions" program element says that "the limiting critical potential should not be more negative than -1200 mV." The use of "should not" implies that -1200 mv is a recommendation not a requirement, but the wording is not completely clear.	
Description of Changes pdf Page 2, 2 <sup>nd</sup> Bullet "Coating on Underground Components" 3 <sup>rd</sup> Sentence	The 3 <sup>rd</sup> sentence reads, "As a result of this change, if an applicant's underground steel or copper alloy piping is not coated, the applicant would state an exception and the basis of an exception." It seems like most stations would be taking an exception, except a very few.	As a result of this change, if an applicant's underground steel or copper alloy piping is not coated <u>and there are no indications of corrosion that could challenge the structural integrity or pressure boundary</u> , the applicant would state an exception and the basis of an exception.
Discussion "Description of Changes", page 4  Appendix B "Acceptance Criteria", page B-11	When discussing electrical resistance probes (ERPs), both page 4 and page B-11 state that the application will specify the qualifications of the individuals who will determine the installation locations of the probes and the methods of use. It then gives an example of NACE CP-4, "Cathodic Protection Specialist". It is not clear whether this is just an example of the <u>type</u> of qualification or the <u>level</u> of qualification. For example, elsewhere in the ISG (page B-9) discusses that evaluations are performed by NACE Level 2 or 3. So would that level of qualification (i.e. Level 2 or 3) be adequate for determining the installation locations of the ERPs?	If CP-4 is required, then "e.g." should not be used. If CP-4 is just an example of a type of qualification, then the discussion should indicate that other levels are also acceptable.
P6 / Backfitting	Revision of typo in 2 <sup>nd</sup> sentence under Licensees that already hold a renewed license.	...and consider <del>to</del> this information to ensure that relevant AMPs are, and will remain, effective.

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P7 / 1 <sup>st</sup> paragraph	Editorial – Incorrect comma usage.	...do not extend to the nuclear safety issues of license renewal and the NRC need not address...
P7 / 2 <sup>nd</sup> paragraph	Editorial – Incorrect comma usage.	...do not extend to the nuclear safety issues of license renewal and the NRC need not address...
A-1 / 1 <sup>st</sup> paragraph	Editorial – Incorrect comma usage.	...actions (i.e., coatings, backfill quality, and cathodic protection).
Page A-1 Description of program, 6 <sup>th</sup> sentence.	Actions required when cathodic protection does not meet acceptance criteria are inconsistent with the XI.M41 element 6. Alternate acceptance criteria are allowed under NACE SP0169.	Recommend revising the 6 <sup>th</sup> sentence as follows: Where the acceptance criteria for the effectiveness of the cathodic protection is other than -850 mV instant off <u>or 100 mV shift</u> , <del>actual</del> loss of material rates are measured from in-situ coupons <u>or installed electrical resistance corrosion rate probes</u> .
Appendix B, Program Description, end of 1 <sup>st</sup> paragraph	The revised AMP uses the term "cementitious" in places and the term "reinforced cement and asbestos concrete pipe".	Recommend "cementitious" be defined; further, it should be consistently used with concrete materials.
Element 1 / Page B-1	Editorial – Incorrect comma usage.	... refers to plastics or other polymers...
Scope of Program / App B	Added sentence "The term "polymeric" material refers to plastics, or other polymers that comprise the <u>structural element</u> of the component" has the	Since the function of mechanical components managed by this program is either pressure boundary or leakage boundary, consider replacing the words "structural element"

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	potential to imply something other than intended.	with "pressure" or "leakage boundary."
Element 2, Table 2 / Page B-1	Reinforcement in cementitious materials is protected by CP for Reinforced Concrete Pipe & PCCP. Coatings are a less common mitigation for RCP.	Recommend adding CP to Preventive Actions for cementitious pipe and remove reference to coatings being a requirement.
Page B-1 Element 1 & program description	The program description was revised to remove the discussion of the applicability with the Selective Leaching Program. Recommend that the discussion of the applicability of the Selective Leaching program be added to Element 1 similar to the discussion of the Bolting Integrity Program in Element 1. Page 5 of the ISG notes that the recommendations related to reductions in the extent of inspections for AMP XI.M33 have been moved to AMP XI.M33 with no technical changes. When will these AMP XI.M33 changes be issued for industry use and reference?	Recommend the following be added to element 1: <u>This program does not provide aging management of selective leaching. The Selective Leaching of Materials (AMP XI.M33) is applied in addition to this program for applicable materials and environments.</u>
Preventive Actions / App B	Omission of the "When provided..." wording for underground coating recommendation will likely result in the need for exception by most applicants. The justification for this action in discussion on page 2 indicated that "typical air conditions in underground vaults have higher moisture content than uncontrolled indoor air conditions in plant	Recommend providing an allowance that underground (not buried) piping / tanks may be uncoated, or may have standard protective film coatings (paint). Specify that an increase in number or frequency of inspections is warranted if wetted conditions or evidence of more than minor surface corrosion is noted during initial inspections.



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	<p>spaces within buildings." There is no discussion of what documentation exists to support this statement, but the definition of air-indoor, uncontrolled in NUREG-1801 only assumes that system temperatures are expected to be above the dewpoint. Where system temperatures are expected to be below dewpoint, they are normally insulated to mitigate condensation. For other piping, there is no OE cited that indicates that normal film coatings (i.e., paint) is ineffective at controlling surface corrosion.</p> <p>The presence of coatings in pipe trenches is likely to be an unusual condition, as trenches are (were) generally considered to be a sheltered environment for which coatings are (were) unnecessary. Installation of coatings on underground piping if they don't already exist would likely be impractical... as such, this "preventive" action is more of a design or installation consideration than it is a preventive action. A recommendation made today to use coatings in these locations will likely not result in installation of coatings. Rather, it will result in exceptions to the program recommendations. If the existing industry population of piping/tanks in underground (not buried) locations is predominantly not coated, it would be more beneficial to provide guidance that does not require applicants to take an exception.</p>	
Element 2, Sub-paragraph a / Page	Editorial – Incorrect comma usage.	... copper alloy, and aluminum alloy piping and tanks and underground steel and copper alloy piping and tanks,

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B-2		coatings are...
Page B-2 Element 2.c last sentence	As noted by prior industry comments and NACE International SP0169-2007, use of excessive polarized potentials should be avoided on all metals particularly those metals that could result in excessive generation of hydrogen (e.g. aluminum, titanium, or selected grades of stainless steel). In addition NACE International SP0169 does not provide a limiting critical potential to prevent damage of coatings. Consistent with SP0169, the use of excessive polarized potentials on externally coated pipelines should be avoided to minimize cathodic disbondment of the coating.	Recommend the last sentence be revised to read: To prevent damage to <del>the coating</del> <u>metallic components</u> , the limiting critical potential should not be more negative than -1200 mV. <u>A further over-protection limit shall be defined by the applicant and managed during surveillance activities.</u> <u>The use of excessive polarized potentials on externally coated pipelines should be avoided.</u>
Element 2, Sub-paragraphs a – d / Page B-2	References to NACE SP0169-2007 should be replaced or supplemented by reference to latest edition, SP0169-2013, particularly with respect to Table 1a/1b for coatings.	Recommended change: NACE SP0169- <del>2007</del> <u>2013</u>
Element 3.a.i / Page B-3	Corrosion nomenclature change.	Recommended change: microbiologically-influenced corrosion.
Element 3.a.iii. / Page B-3	Recommend deletion of loss of material due to wear for polymeric materials, or cite relevant OE showing this to be an applicable AE of concern. Is the OE definitive in concluding that the wear was a result of objects slowly migrating over time due to seasonal changes, versus damage incurred during original backfilling?	Recommended change provided in comment.

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Element 3.a.iv / Page B-3	Editorial – Incorrect comma usage.	... asbestos cement pipe and concrete pipe;
Element 3.a.vi / Page B-3	Editorial – Semicolon between aging effects implies another bullet based upon the preceding structure in this section. Recommend a comma.	Recommended change: vi. cracking due to aggressive chemical attack and leaching, changes in material properties due to aggressive chemical attack, for reinforced concrete and asbestos cement piping.
Element 3.b / Page B-3	Suggest addition of other NDE technologies and potentially cross-referencing EPRI Buried Pipe NDE Guide.	Ultrasonic testing (UT), Magnetic Flux Leakage (MFL), Pulsed Eddy Current (PEC), Saturated Low Frequency Eddy Current (SLOFEC), and other non-destructive means may be used to measure wall thickness... <u>Applicants must ensure that evaluation technologies are fit for purpose and comply with governing codes, where applicable.</u>
Element 3.c / Page B-3	Coatings may be intact, but could be disbanded.	Replace the following sentence: Intact coatings do not have to be removed to inspect for potential cracking."  Recommended wording: <u>Coatings that are intact, well-adhered, and otherwise sound for the remaining inspection interval do not have to be removed.</u>
Element 4, 1 <sup>st</sup> paragraph, bottom of page / Page B-3	Editorial – Incorrect comma usage.	For multi-unit sites, the inspections are...
Appendix B / page B-3	The section for parameters monitored or inspected fails to identify the appropriate parameters to monitor. Item d. is the only item that identifies any	Recommend adding appropriate parameters to monitor.

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	parameters to monitor, that is, "pipe-to-soil potential and cathodic protection current." Parameters monitored or inspected must be things that you can monitor and inspect even when there are no signs of aging effects. They must match the detection methods. For visual inspections and surface examinations, the only parameter that can be monitored is surface condition. Wall thickness should be the parameter monitored for the UT examinations. The AMP does not provide parameters to monitor for flow testing, jockey pump activity monitoring, or annual system leak test. Listing the applicable aging effects under parameters monitored and inspected is not consistent with the SRP description of the ten program elements.	
Appendix B, Element #4, Page B-4, top paragraph 2 <sup>nd</sup> sentence	The sentence reads, "Piping inspections are typically conducted by visual examination of the external surfaces of pipe or coatings." It does not address the scenario where much of the buried piping is encased in concrete, which industry sees as controlled low strength material backfill).	Recommended change: Piping inspections are typically conducted by visual examination of the external surfaces of pipe, <u>encasement if encased in controlled low strength material backfill</u> or coatings.
Element 4, Table 4, Preventive Action Categories D & E / Page B-6	<p>Eliminate the need to perform soil testing and confirm non-corrosive soil as part of Category E, and reverse the number of inspections between Categories D &amp; E.</p> <p>Preventive Action Category D prerequisites are that soil has been proven non-corrosive per Element 2 Section e.iv (i.e., soil tests performed; locations, results, methodology submitted in the LRA). No</p>	<p>Recommended changes:</p> <p>Switch the number of inspections between categories D&amp;E.</p> <p>Remove requirement to perform soil testing and demonstrate non-corrosive soil for category E.</p>

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	<p>cathodic protection is required.</p> <p>Preventive Action Category E prerequisites are that coatings and backfill meet preventive measure criteria, as-found coatings have been found in satisfactory condition, and soil has been demonstrated non-corrosion by performing soil test results prior to LRA submittal, and every 10-year period during PEO. Cathodic protection is provided, but not performing at desired level.</p> <p>A station should perform fewer inspections when it has demonstrated it has coatings and backfill meeting preventive measures, a history of satisfactory as-found coating conditions, demonstrated non-corrosive soil, and some level of cathodic protection, than a station which has also demonstrated non-corrosive soil but has no cathodic protection at all.</p> <p>Alternatively, the existing numbers would be sufficient for stations which do not need to provide evidence of non-corrosive soil as many northern plants (where roadways are salted) would meet the definition of "mildly" or "moderately" corrosive soil per existing guidelines such as AWWA Standard C105 and Table 20.1 of C.P. Dillon Corrosion Control in the Chemical Process Industries. Effectively, this would prevent many/most northern plants from meeting definition of "non-corrosive" and ever meeting Preventive Action Category E.</p>	

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Element 4, Table 4, Preventive Action Category E / Page B-6	<p>If the previous comment is not incorporated, Table 4, Category E, part b.iii.5 should be deleted.</p> <p>Item 5 precludes any station from meeting preventive action category E if soil samples are not performed prior to LRA submittal. If a definition or standard of what constitutes acceptable soil conditions was defined in the table, this would allow stations flexibility to perform soil sampling, testing, and evaluation at any time following issuance of a renewed license and meet the same intent as submitting the results with the LRA. As a result, stations could then adhere to Preventive Action category E should their cathodic protection underperform during any 10-year period and fail to meet category C criteria, and not have to default to category F instead.</p>	<p>Recommended changes:</p> <p>Delete Table 4, Category E, part b.iii.5:</p> <p><del>5) Provides a summary of the results and conclusions of the soil testing in the LRA.</del></p>
Element 4, Table 4, subpart E.a / Page B-6	Suggest clarifying whether sites with excessive cementitious backfill are included.	<p>Recommended change:</p> <p>An analysis, conducted in accordance with the "preventive actions" program element of this AMP, has demonstrated that installation or operation of a cathodic protection system is impractical, <u>apart from areas affected by cementitious backfill; or...</u>"</p>
Page B-6 and B-7, Table 4 Category E.b.iii	<p>As written, these criteria could be extremely difficult to meet.</p> <p>1). Criterion E.b.iii should be revised to indicate that mildly corrosive soil environment may be acceptable. As written the soil environment must be demonstrated to be not corrosive. All soil environments have some corrosive tendencies. The</p>	<p>Recommend revising the following portions of Category E.B.iii as follows:</p> <p>E.b.iii Soil <u>environment</u> has been demonstrated to be <del>not</del> <u>corrosive non-aggressive</u> for the material type and would not result in a loss of intended function prior to the end of the PEO. In order to demonstrate that the soil is not</p>

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	<p>analysis should demonstrate that an aggressive environment does not exist that would result in loss of intended function prior to the end of the PEO. Plants in northern environments typically have mildly aggressive soil environments next to roads that are heavily salted in winter.</p> <p>2.) Criterion E.b.iii.4) should be revised to delete or reword the reference to submitting the application. This would allow plants with renewed license to use Category E rather than Category F.</p> <p>3.) Criterion E.B.iii.5 prevents the use of Category E if soil samples are performed prior to LRA submittal.</p>	<p><del>corrosive</del> aggressive, the applicant:</p> <p>E.b.iii.4) Conducts soil testing <del>prior to submitting the application</del> and once in each 10-year period starting 10 years prior to the period of extended operation.</p> <p>E.b.iii.5) Provides a summary of the results and conclusions of the soil testing <del>in the LRA</del> <u>to the NRC</u>.</p>
Element 4.a, 2 <sup>nd</sup> sentence / Page B-7	Typo.	...For example, degraded performance of the cathodic protections system...
Element 4.a, last sentence / Page B-7	Last sentence of section should be clarified, with regards to the inability to credit inspections performed as part of the transition allowance as also counting as those required during the following interval.	These additional inspections conducted <u>during the four years following the end of an inspection interval</u> cannot <u>also</u> be credited towards the number of inspections stated in Table 4 for the <u>following</u> 10-year interval.
Detection of Aging Effects / App B Page B-8	It's not clear how the section c.iii extent of inspections for fire protection piping must be integrated with other inspections. If the piping is of the same material category as that in other systems, it's not clear that the inspections must include any fire protection piping at all, even if the extent of inspections is expanded as directed. The inspections are still based only on the material (and preventive conditions), not on the system.	If the intent is that at least two inspections be performed on Fire Protection piping, then clarification should be provided in this section, or in Table 4. The remainder of the program is written such that no Fire Protection piping need be inspected if the system is monitored via approved alternatives.

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Element 4.d / Page B-8	Suggest advising safe accessibility as well as risk.	... selected based on risk (i.e., susceptibility to degradation and consequences of failure) <u>and consider safe accessibility.</u>
Page B-8 element 4.b.iii	Element 4.b.iii (Exceptions to Table 4 Inspection Quantities) notes that when Preventative Action Category A or C is met for all materials except aluminum alloys, no inspections are necessary if all piping constructed from a specific material type is fully backfilled using controlled low strength material. There is no Preventative Action Category A defined for Table 4.	Revise 4.b.iii as follows: <u>For polymeric piping or</u> when Preventative Action Category <del>A or</del> C is met for all materials except aluminum alloys, no inspections are necessary if all piping constructed from a specific material type is fully backfilled using controlled low strength material.
Detection of Aging Effects App. B, b.iii, Page B-8.	Item b.iii has "Category A shown" which no longer exists.	Delete Category A.
Detection of Aging Effects App. B, b.iv, Page B-8.	Item b.iv has "Category B shown" which no longer exists.	Delete existing text, "Category B shown."
Appendix B, Element #4, Page B-8, b.iii	What is "Preventive Action Category A?"	Please define.
Appendix B, Element #4, Page B-8, b.iv	The sentence states "If all of the in-scope polymeric material is nonsafety-related, the inspection quantities for Preventive Action Category B may be reduced by half." However, there are no inspection	Recommend rewording as follows: If all of the in-scope polymeric material is nonsafety-related, the inspection quantities <del>for in</del> Preventive Actions <del>Category B</del> may be reduced by half.



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	quantities in preventive action category B for polymeric materials	
Appendix B, Page B-8, section point d.	"Piping inspection locations are selected based on risk (i.e., susceptibility to degradation and consequences of failure)."	Recommend additional sentence=> <u>In general, inspection locations as well as re-inspection intervals should be based on new risk results by re-integrating the monitoring and inspection results into plant's buried piping risk database in order to update determine future re-inspection locations and intervals.</u>
Element 4.e.ii / Page B-9	Design pressure testing is only required for ASME structural credit and is not advised as a corrosion evaluation methodology. At a 5-year interval, operating pressure should be sufficient to identify / address vulnerabilities for nonsafety-related segments. Adding continuity and bounding components will compensate for this lesser pressure. This is consistent with NEI 09-14 guidance.	Recommended rewording: The piping is pressurized to 110 percent of the design pressure of any <u>bounding</u> component within the boundary with test pressure being held for a <u>continuous</u> eight hours <u>interval</u> .
Element 4.e.iii / Page B-9	Inspections must be qualified to address threats.	The inspection method has been demonstrated to be capable of detecting both general and pitting corrosion and is qualified by the applicant <u>to identify/evaluate potentially unacceptable flaws.</u>
Element 4.f. / Page B-9	Inspections must be qualified to address threats.	...demonstrated to be capable of detecting both general and pitting corrosion and is qualified by the applicant <u>to identify / evaluate potentially unacceptable flaws.</u>
Page B-9 Element 6.a.	Add a third coating qualification option that requires inspection and evaluation of buried external coating by a coating specialist qualified in accordance with	Recommend Element 6.a. be revised as follows: For coated piping or tanks, there is either no evidence of coating degradation, or the type and extent of coating degradation is evaluated as insignificant by an individual

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Section/ Page Reference	Comment	Suggested Wording/Revision
	an ASTM standard endorsed in Reg Guide 1.54 including staff limitations associated with a particular standard. Reg Guide 1.54 Rev 2 endorses ASTM D4537-04a and ASTM D7108-05 which establish guidelines to qualify coating inspectors and Nuclear Coating Specialists.	possessing NACE Coating Inspector Level 2 or 3 inspection qualification, <u>qualifications in accordance with an ASTM standard endorsed in Regulatory Guide 1.54 including staff limitations associated with a particular standard</u> , or an individual who has attended the EPRI Comprehensive Coating Course and complete the EPRI Buried Pipe Condition Assessment and Repair Training Computer Based Training Course.
Element 6.c / Page B-9	Add rust staining as an indicator of migration without leakage due to insufficient cover.	...leakage or exposed or rust staining from rebar or reinforcing "hoop" bands.
Element 6.f / Page B-9	Hydro testing is overly specific for some piping systems, functions, and conditions.	For <del>hydrostatic</del> <u>pressure</u> tests, the test acceptance criteria are that there are no visible indications of leakage, and no drop in pressure within the isolated portion of the piping, that is not accounted for by a temperature change in the test media or by quantified leakage across test boundary valves.
Element 6.f / Page B-9	Editorial –Incorrect comma usage.	...isolated portion of the piping that is not accounted for...
Appendix B /page B-9	Acceptance criterion of no pressure drop seems abnormally stringent for a hydrostatic test. Isn't it normal to have such tests deemed acceptable based only on visual inspections not identifying leakage?	N/A
Element 6.g / Page B-10	Editorial –Incorrect comma usage.	...leakage from buried piping are, not occurring.
Element 6, Table 6	Add -1200mV acceptance criterion for aluminum	-Add -1200mV acceptance criterion for aluminum.

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/ Page B-10	<p>piping per NACE SP0169-2013.</p> <p>-Similar to relocation of discussion on precautions of overprotection of coated piping, recommend discussion on precautions of overprotection of PCCP pipe be moved to Element 2 as a preventive measure as well.</p>	Relocate PCCP overprotection discussion to Element 2.
Appendix B, Table 6, foot note 2	This table uses -1,000 mV. In other areas -1,200 mVs are used? Need to be consistent in all locations where 1200mV is used such as 2.b that implies 1200 is the criteria for all when it isn't for prestressed concrete piping as discussed in Table 6.	Recommend adding to 2.b, <u>For prestressed concrete cylinder piping the potential should be no more than -1000 mV to prevent hydrogen generation or embrittlement of the prestressed wiring.</u>
Appendix B "Acceptance Criteria" Table 6, page B-10	<p>Page B-10, Table 6 provides CP acceptance criteria (-850 mV relative to a CSE instant off for Steel). If acceptance criteria are not met, that test point is not considered "effective" and would result in transitioning into a higher inspection category. However, Note 2 within this table states that "Where an impressed current cathodic protection system is utilized with pre-stressed concrete pipe, steps are taken to avoid an excessive level of potential that could damage the prestressing wire. Therefore, polarized potentials more negative than -1000 mV relative to a CSE are avoided...". It is not clear whether the -1000 mV for pre-stressed concrete pipe is a criterion that would determine whether the protection is "effective" that would result in transitioning into a higher inspection category if exceeded, or just a level to be avoided.</p>	If it is meant to be an acceptance criterion, then include the -1000 mV in the body of the table rather than a footnote. If it is not an acceptance criterion, that should be clarified in the footnote.

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Element 6.k.iv / page B-10 & B-11	<p>The -650mV and -750mV criteria should not need to be confirmed via the 1mpy criterion. If &lt;1mpy corrosion is occurring, as indicated by an ER probe, this is confirmation itself of lack of corrosion, such that a secondary evaluation need not be performed of whether test points are also meeting -650mV and -750mV at locations of high resistivity soils. These alternative values for high resistivity soils are presented in ISO 15589-1 as valid stand-alone acceptance criteria, not requiring confirmation via other means.</p> <p>This is particularly relevant to piping which is backfilled in cementitious material. Cementitious materials often have very high resistivity values, but an ER probe would be unable to provide representative corrosion rates of pipes embedded in concrete backfill. Without breaking apart the cementitious fill and directly examining the embedded pipe, there are few practical means to otherwise confirm absence of on-going corrosion. This requirement to confirm corrosion rates should especially not be applicable to piping embedded in cementitious materials.</p>	Recommend only requiring the soil resistivities be verified every 5 years for application of the -650mV and -750mV criteria.
Element 6.k.iv / page B-11	The 100mV criterion should not be required to be proven effective by periodic assessment of a 1mpy criterion. The 100mV criterion can be proved effective in a mixed metal environment for a material that is not the most anodic, through a variety of means.	Recommend removing requirement to validate corrosion rate (<1mpy) when demonstrating the 100mV polarization criteria. Acceptability of 100mV shift as an acceptance criterion could be documented in an engineering evaluation, if necessary.

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	<p>The 100mV shift can be proven effective with 3 basic components; reference cell, non-cathodically protected metal object that is electrically isolated from a mixed-metal environment, and a cathodically protected protect metal object of the same material that is interconnected with the mixed metal-environment. So long as the instant-off polarization potential difference between the non-cathodically protected object and cathodically protected object is &gt;100mV, this is demonstration of 100mV of polarization. While certain sophisticated ER probe assemblies (i.e., "smart-stacks") prove this with ER probes, which also are able to provide information on corrosion rates, ER probes are not exclusively required to perform this assessment. As such, validation of &lt;1mpy corrosion rates in all applications is not possible, nor should it be required.</p> <p>Demonstration of this 100mV shift is in accordance with NACE SP0169-2013, and numerous international standards, which have long established this as evidence of effective cathodic protection and not requiring validation of material loss rates through other means. Inclusion of the requirement to verify effectiveness of the 100mV shift, as evidence by also monitoring corrosion rate over time, is beyond the scope and requirements of NACE SP0169-2013 and all international CP standards, and thus, should not be included in LR-ISG-2015-01.</p>	
Page B-10 and B-11	ISO 15589-1, an international standard on cathodic	Recommend revising Table 6 to allow the application of -650

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Element 6.k.	<p>protection, cites additional cathodic protection guidance on cathodic protection acceptance criteria that should be incorporated into XI.M41. The acceptance criteria for cathodic protection polarization of steel piping, specifically the -850mV criterion, should be modified to incorporate guidance provided in ISO 15589-1. This ISO standard lists other CP potential values based upon soil resistivity.</p> <table><tr><td>&lt;100ohm-m</td><td>-850mV</td></tr><tr><td>100-1000 ohm-m</td><td>-750mV</td></tr><tr><td>&gt;1000ohm-m</td><td>-650mV</td></tr></table> <p>The -650 mV and -750 mV criteria based on soil resistivity should not need to be confirmed by the 1mpy criterion.</p>	<100ohm-m	-850mV	100-1000 ohm-m	-750mV	>1000ohm-m	-650mV	mV and -750 mV acceptance criteria based on soil resistivity and deleting confirmation by the 1mpy criterion and require only soil resistivity be verified every 5 years.
<100ohm-m	-850mV							
100-1000 ohm-m	-750mV							
>1000ohm-m	-650mV							
Page B-10 and B-11 Element 6.k	The 1 mpy acceptance criterion should be revised to note that corrosion rates in excess of 1 mpy may also be acceptable if the corrosion rate would not result in a loss of intended function prior to the end of the PEO.	Recommend adding the following to the first paragraph on page B-11 just prior to the last sentence: <u>Corrosions rates in excess of 1mpy may be acceptable if an engineering evaluation demonstrates that the corrosion rate would not result in a loss of intended function prior to the end of the PEO.</u>						
Element 7.a / Page B-11	Nonconforming fill requires guidance on corrective actions to focus results.	...observed damage will not lead to further degradation <u>(e.g., indirect assessments of coatings / CP integrity or CP performance within specifications to address risks to damaged areas).</u>						
Element 7.b / Page B-11	Editorial – Incorrect comma usage.	...large area minimum wall thickness and local area wall thickness...						

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Element 7.c / Page B-11	Where the coatings, backfill, or the condition of exposed piping reveals piping integrity results that do not meet acceptance criteria, the degraded component is repaired or replaced. In addition, an expansion of sample size is conducted to evaluate the at-risk condition identified (e.g., damaged coatings due to nonconforming fill and poor CP). The number of inspections within the affected piping categories are doubled or increased by 5, whichever is smaller. If nonconforming piping integrity conditions are identified in any of the expanded samples, an analysis is conducted to determine the extent of condition and extent of cause. The number of the follow-on inspections is determined based on the extent of condition and extent of cause.	Recommend restricting corrective actions to integrity-driving risks and not merely nonconforming controls.
Element 7.f. / page B-12	<p>This recommended corrective action does not seem necessary. Alternatives to the -850mV criterion are intended to demonstrate, through other means, whether the CP system is effective. If, through these other means, CP is still found to be ineffective, the consequence should be no different than if the -850mV criterion was used and not met...specifically, it would count against the Effectiveness criteria contained in Table 4 and result in changes in preventive action categories (e.g., drop from Category C to E or F).</p> <p>If corrosion rates consistently came back &gt;1mpy, indicative of on-going corrosion, the piping segment would thereby meet category E or F, and require</p>	<p>Recommended change:  <del>f. When using the alternatives to the -850 mV relative to a CSE instant off acceptance criterion for the cathodic protection system, the application states what actions will be taken if the measured external loss of material acceptance criterion, or internal loss of material rates (if opportunistic inspections are conducted by other AMPs) is exceeded.</del></p>

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	inspection. If corrosion rates came back >1mpy once or twice over 10 years, this would not be indicative of significant corrosion and cause for concern.	
Appendix B "Corrective Actions", page B-12	Corrective Actions element part "g" discusses the option of monitoring the activity of a jockey pump instead of inspecting buried fire water system piping. It contains a cross reference to "4.d.i". The cross reference seems incorrect as Section 4 "Detection of Aging Effects" part "d" does not contain an item "i".	It seems that the correct cross reference should be <u>4.e.i.</u>
Element 10 / Page B-12	SP0169-2013 has relevant guidance for design / application of CP.	Such as those prescribed in NACE SP0169-2007, NACE SP0169-2013, and NACE RP0285-2002
Element 10 / Page B-12	Editorial – Incorrect comma usage.	...plant-specific and nuclear industry operating experience and to modify its AMP, accordingly.
References / Page B-13	Suggest adding EPRI guidance, if permissible.	Recommendations for Buried Piping / Tanks and the Buried Piping NDE Reference Guide.
General	We agree with many of the revisions incorporated by this ISG. The revisions are based on industry operating experience and lessons learned consistent with the NEI 09-14 industry initiative for management of underground piping and tank integrity. The revisions provide flexibility for aging management of underground piping and tanks, incorporation of applicable program improvements, and consideration of applicable industry operating experience.	Comment – no revision required.