NEI REGULATORY ISSUES TASK FORCE POSITION PAPER
OCTOBER 20, 2015
NRC TASK INTERFACE AGREEMENT TIA 2014-01

Executive Summary:

NRC Task Interface Agreement (TIA) 2014-01 was issued on May 7, 2015 and was subsequently withdrawn in October, 2015 to be replaced by a NRC generic communication that is currently under development. This paper addresses statements that were documented in the TIA. For the purposes of discussion throughout this NEI paper, references to TIA 2014-01 will be used to represent the industry's current understanding of NRC's regulatory position.

The subject of TIA 2014-01 concerns inspections conducted during 2012 and 2013 at Monticello, D. C. Cook and Palisades where NRC inspectors identified several safety-related SSCs in mild-environments installed for periods greater than the period of time specified in vendor correspondence, vendor manuals or Certificates of Compliance. The licensees were neither replacing the SSCs nor documenting an evaluation to justify extending use of the SSCs beyond the timeframe specified in these documents. The TIA effectively concludes that if a safety related SSC exceeds the vendor replacement or refurbishment interval (referred to as "service life" in the TIA) without an evaluation to extend the interval, a nonconformance with the design criteria exists. The licensee must identify this as a nonconforming condition in accordance with their operability/functionality and corrective action program.

The NRC conclusions stated in TIA 2014-01 appear to be based on an oversimplification of the many inputs that are required to develop effective maintenance programs and do not address all of the regulations and regulatory guidance regarding this topic. The TIA represents a significant expansion of regulatory requirements with respect to design basis information, maintenance programs, and mild environment equipment qualification, while not taking into account existing regulatory requirements for quality assurance programs, the Maintenance Rule, and industry initiatives and standards that drive improvement in equipment reliability.

The industry agrees that vendor information such as vendor correspondence, vendor manuals or Certificates of Compliances can contain information that should be considered when evaluating the replacement or refurbishment interval of an SSC. However, the industry does not agree that vendor replacement or refurbishment interval information is design bases information as defined in 10 CFR 50.2 or supporting design bases information NEI 97-04, Design Bases Program Guidelines, Revision 1. It then follows that, it is the industry position that the TIA should not make an overreaching conclusion that a nonconformance exists when vendor replacement or refurbishment intervals are exceeded. The TIA does not apply the established distinction between the design process which derives the functional requirements for an SSC, and the operational phase including maintenance which ensures that these functional requirements are met by establishing maintenance schedules in accordance with quality assurance programs. Information contained within vendor correspondence, vendor manuals or

Certificates of Compliance are used to inform a design, but cannot establish the design or operational acceptance criteria on their own merits.

Existing regulatory requirements and NRC endorsed quality assurance program standards do not require licensees to adhere to vendor replacement or refurbishment intervals or formally evaluate deviations from those recommendations under the licensee's Appendix B quality assurance program. With that said, the industry agrees that there have been some failures to establish or maintain appropriate maintenance schedules, and when this occurs, these should be characterized as violations of 10 CFR 50 Appendix B, Criterion V and Regulatory Guide 1.33, Quality Assurance Program Requirements.

TIA 2014-01 effectively changes existing NRC rules by establishing an equipment qualification requirement for all safety related equipment located in mild environments beyond that defined in 10 CFR 50.49. It implies, without limitations, that there exists a uniform level of quality to vendor maintenance recommendations contained within vendor correspondence, vendor manuals or Certificates of Compliance. More pointedly, the TIA considers vendor replacement or refurbishment interval recommendations for equipment in mild environments as a specified design criterion in accordance with 10 CFR 50.2 and Appendix B, Criterion III, to be translated into absolute thresholds for maintenance frequency. It presumes that this information provided by vendors is certified to a specific plant, unless formally evaluated differently by the licensee.

NRC positions in TIA 2014-01 have not been reconciled with NRC regulatory requirements and Statements of Consideration in 10 CFR 50.65 for the Maintenance Rule. The industry is concerned that NRC positions stated in the TIA are inconsistent with 10 CFR 50.65 and the supporting Statements of Considerations. The TIA does not acknowledge the performance based objectives of the Maintenance Rule that were put in place by the Commission to monitor the effectiveness of maintenance programs, intentionally without requiring prescriptive preventive maintenance activities. The TIA does not discuss the relationship of NRC positions stated in the TIA with respect to requirements of 10 CFR 50.65 for the Maintenance Rule. The TIA does not address Maintenance Rule implementing guidance as described in Regulatory Guide 1.160 and NUMARC 93-01, Revision 4A, which provide a performance based, risk-informed method for monitoring the effectiveness of maintenance, to meet requirements of the Maintenance Rule.

TIA 2014-01 does not adequately recognize industry use of the EPRI PM Basis Database Program as an acceptable method to evaluate maintenance schedules in accordance with quality assurance program requirements. The industry believes that use of the EPRI PM Basis Database Program to establish or modify maintenance schedules for safety-related SSCs in mild environments meets quality assurance program requirements and Regulatory Guide 1.33 for maintenance programs. Use of the EPRI PM templates to account for functions of the SSC, site specific OE, service conditions and duty cycle, constitutes an evaluation that meets the requirements of the aforementioned regulations, standards and NRC positions, with regard to evaluating deviations from vendor replacement or refurbishment intervals. The NRC positions described in TIA 2014-01 will drive maintenance of safety related equipment in a mild environment from one that is performance based to one that is based on deterministic replacements with no demonstrated or measureable improvement in safety, reliability or availability. It is the contention of the industry that these new staff positions will have an opposite

effect in that resources will be required to be focused on less critical SSCs to address a perceived but not realized quality issue.

NRC positions established in TIA 2014-01 will shift maintenance efforts to SSCs that are less risk-significant. The NRC positions in TIA 2014-01 will require that the industry treat all vendor replacement or refurbishment interval recommendations as design requirements. The effect of this approach is that the TIA will arbitrarily raise the importance of SSCs where such vendor information has been provided, and result in non-conservative maintenance strategies that could introduce more opportunities for "Infant Mortality." This would directly result in unnecessary industry maintenance expenditures diverting resources away from other needed expenditures and could result in a negative impact on plant reliability and safety. Expanding beyond current requirements and accepted industry practices can actually impede effective maintenance of equipment as time and resources are directed toward SSCs with artificially inflated risk significance. The NRC positions stated in the TIA require a level of proof that goes beyond what is reasonable to deviate from vendor recommendations for replacement or refurbishment intervals. This could impose a significant new burden on stations and is counter to the risk-informed, graded approach required for successful management of equipment. There is a bias in the TIA that maintenance programs should have time-based replacement or refurbishment criteria as defined by the by the vendor. This conflicts with the intent of the Maintenance Rule which allows for the establishment of a performance and/or condition based program against licensee established goals. The TIA does not take into account the role that the Maintenance Rule plays in ensuring reliability of safety significant equipment.

In summary, the following industry positions are proposed to address concerns regarding vendor replacement or refurbishment intervals of safety related SSCs:

- Deviations from vendor correspondence, vendor manuals or Certificates of Compliance regarding replacement or refurbishment intervals are acceptable under licensees' quality assurance programs, which address development and modification of maintenance schedules during the operational phase, when licensees have implemented other programs for development of preventive maintenance schedules including the EPRI PM Bases Database Program.
- A nonconformance does not exist based only on the identification of safety related SSCs that are in operation for periods of time greater than the vendor recommended replacement or refurbishment intervals provided in vendor correspondence, vendor manuals or Certificates of Compliance.
- Licensees are required to develop and maintain maintenance schedules in accordance with the requirements of 10 CFR 50 Appendix B, Criterion V, Regulatory Guide 1.33, and the licensee's quality assurance program. Regulatory concerns should address the licensee's compliance with these requirements because vendor correspondence, vendor manuals or Certificates of Compliance related to replacement or refurbishment intervals are not 10 CFR 50.2 design bases or supporting design information.
- Licensees' reviews of the effectiveness of maintenance required by the Maintenance Rule should evaluate modifications to maintenance schedules to address unacceptable failures of safety related SSCs.

Introduction

Task Interface Agreement (TIA) 2014-01, Regulatory Position on Design Life of Safety-Related Structures, Systems, and Components Related to Unresolved Items at Donald C. Cook Nuclear Power Plant, Monticello Nuclear Generating Plant, and Palisades Nuclear Plant, was issued on May 7, 2015. During PIR inspections at Monticello and Palisades, and during a CDBI inspection at D. C. Cook, inspectors identified several safety-related SSCs in mild-environments installed for periods greater than the period of time specified in vendor correspondence, vendor manuals or Certificates of Compliance. The licensees were neither replacing nor documenting an evaluation to justify extending use of the SSCs beyond the period specified in these documents. The Introduction states that the TIA documents the existing regulatory position, "Regarding safety-related SSCs that have been in service longer than their documented service life, as specified in the licensee's 10 CFR 50.2 design bases or supporting design information, or where information has been identified that challenges either: the service life documented in the licensee's 10 CFR 50.2 design bases or supporting design information; or the licensee's presumed service life for the safety-related SSC."

The TIA Conclusion states that, "If a safety related SSC exceeds its specified service life or the licensee has information that challenges the presumption that a safety-related SSC can perform its specified function(s), the licensee must promptly address the nonconforming condition in accordance with their operability/functionality and corrective action program. Justification for extending service life must consider plant-specific operational experience, including maintenance and testing. In the circumstances described above, if the SSC's specified service life has already been exceeded, a nonconformance with the design criterial exists."

This paper documents industry concerns with NRC positions stated in TIA 2014-01. The key points are:

- Vendor correspondence, vendor manuals or Certificates of Compliance regarding replacement or refurbishment interval recommendations are not 10 CFR 50.2 design bases or supporting design information.
- A nonconformance does not exist when safety related SSCs are in operation for periods greater than the period of time specified in vendor correspondence, vendor manuals or Certificates of Compliance.
- 10 CFR Part 50, Appendix B, Criterion V, Instructions, Procedures, and Drawings, and Regulatory Guide 1.33, Revision 2, Quality Assurance Program Requirements, contain the requirements for development and modification of maintenance schedules during the operational phase.
- The TIA effectively establishes a mild environment equipment qualification program that is not required by 10 CFR 50.49 and related regulatory guidance documents.

- The compliance based approach to vendor replacement or refurbishment interval recommendations has not been reconciled with the performance based requirements and Statements of Consideration for the Maintenance Rule.
- Use of the EPRI PM Basis Database Program and templates is an acceptable method to evaluate changes from vendor replacement or refurbishment intervals provided in vendor correspondence, vendor manuals or Certificates of Compliance.
- NRC positions stated in TIA 2014-01 will have the effect of shifting maintenance efforts to SSCs that have vendor replacement or refurbishment interval information compared to those that do not, regardless of risk significance of the SSCs.
- The Backfitting Considerations in TIA 2014-01 are inadequate.

Summary of Unresolved Items at D. C. Cook, Monticello, and Palisades (TIA 2014-01)

D. C. Cook, Inspection Report 2012007, January 11, 2013: During a CDBI, the inspectors noted the certificate of compliance for the HFA relays stated a 41-year service life. A 21-year service life was noted for the HEA and HGA relays and a 10-year service life from the time of manufacture for the Agastat relays. The inspectors noted the licensee was not managing the replacement of the safety-related (SR) relays and contactors associated with the electrical systems and SSCs to prevent exceeding the manufacturers' recommended service lives. At the time of the inspection, none of the installed HFA relays had exceeded the 41-year service life.

Monticello, Inspection Report 2012008, November 29, 2012: During a PIR inspection, the inspectors noted that safety related (SR) HFA relays had been installed greater than 40 years in the plant. The inspector noted a licensee study which had recommended replacing the relays at 40 years based on vendor recommendations. The licensee initiated scheduling relay replacements; however, implemented a 25 percent "grace period" which extended time beyond the recommended 40 years. The inspectors were aware that the same type of relays at contemporary plants had a 40-year life designated on the certificate of compliance received from the supplier when the relays were purchased. Based on the inspectors' questions, the licensee initiated CAP 1353945, "2012 PI&R Inspection – Question on Exceeding Relay Service Life," and concluded the relays were operable based on satisfactory surveillance performance. The inspectors disagreed with the conclusion since the existing surveillance tests did not test the relays to the design requirements. The licensee expanded the assessment by completing an operability recommendation (OPR) which also concluded the relays were operable. The discussion in the OPR stated the relays at Monticello did not have a service life on the certificates of compliance when they were originally purchased; therefore, the licensee considered the relays to be operable until a failure was noted (essentially a run-to-failure). The inspectors were concerned the licensee had not incorporated more recent vendor information regarding service life and had not extended the service life or replaced installed safety related equipment before exceeding the vendor recommended service life.

Palisades, Inspection Report 2013005, February 12, 2014: In 2004, the licensee received Westinghouse Electric Technical Bulletin TB-04-13 02, "Replacement Solutions for Obsolete Classic MCCBs, UL [Underwriters Laboratory] Testing Issues, Breaker Design Life and Trip Band Adjustment," which was

superseded in 2006 by TB-06-02, "Aging Issues and Subsequent Operating Issues for Breakers That are at Their 20-Year Design/Qualified Lives; UL Certification/Testing Issues Update." These bulletins informed the licensee about MCCB aging issues. Specifically, grease and red oil used in these breakers were found to be key limiting factors for continued operability within published specifications. As grease and red oil aged beyond 20 years, their lubrication properties were reduced, resulting in slower trip times beyond the published time-current curves. The bulletins further defined the design life of MCCBs in mild environments as 20 years. However, the inspectors noted that two safety-related MCCBs installed in mild environments exceeded 20 years and the licensee had not performed an engineering evaluation to justify continued operation beyond this design life. The inspectors also questioned the licensee's management of the design life of safety-related Agastat relays installed in mild environments. Specifically, vendor documents specified a life of 10 years from the date of manufacture. However, the licensee was not replacing these components in accordance with the vendor specification and had not performed an engineering evaluation to justify continued operation beyond the published life limit. As a result of the inspectors' questions, the licensee consulted with the vendor who clarified the 10-year life was only applicable to relays installed in harsh environments. In addition, the vendor letter stated that it was at the discretion of the individual licensees to establish their own method for determining service life intervals. The licensee maintained that their Electric Power Research Institute (EPRI)-based preventative maintenance (PM) template evaluations provided the basis for replacement of safety-related components installed in mild environments. Specifically, the licensee evaluated replacement intervals for components based on component criticality and service conditions (i.e., duty cycle). For some components, the replacement interval was based on performance using the PM task results to justify continued use. However, the inspectors questioned if PM activities were sufficient to detect age-related degradation of components in mild environments.

Inspection Findings Related to SSC Maintenance (since 2012)

Salem, Inspection Report 2015002, July 28, 2015: On August 27, 2014, the 12 SI pump failed to start when preparing to fill the 14 SI accumulator. PSEG performed an ACE and determined the apparent cause of the 12 SI pump breaker failure to close on demand was due to not addressing timely overhauls of the breakers. GE completed a failure analysis of the breaker and determined the most probable cause of failure was the lack of lubrication inside the close latch roller. The 12 SI pump breaker was last overhauled in 1996 and was due for its 16 year overhaul in December 2015 per PSEG's work schedule. The PSEG performance centered maintenance (PCM) template process utilizes internal and external operating experience and component history to develop recommended preventive maintenance activities. MA-AA-716-210, "Preventive Maintenance Program," requires that the PCM templates are periodically reviewed, and when applicable updated based on revised EPRI guidance, and internal and external operating experience. The inspectors determined that the failure could have been prevented if PSEG had completed overhauls on the 4kV breakers at EPRI's recommended interval of 8-12 years. The NRC identified that PSEG did not have a basis for the 16 year overhaul frequency. An additional breaker failure occurred on the 11 CCW pump breaker on November 16, 2014. PSEG determined the cause of the 11 CCW pump breaker was the same as the 12 SI pump breaker, which was due to not addressing timely overhauls of the breakers, although the failure mechanism was different. A self-revealing Green NCV of 10 CFR 50, Appendix B, Criterion V, "Instruction, Procedures, and Drawings," was identified

because PSEG did not establish an appropriate interval to overhaul 4kV GE Magne-Blast breakers. As a result, the safety-related breakers for the 12 safety injection pump and 11 CCW pump were operated beyond the industry recommended overhaul interval and subsequently failed.

Waterford, Inspection Report 2014002, May 8, 2014: On January 8, 2014, the essential chiller oil pump B tripped while in service. The licensee determined that wear in the drive gear assembly for the pump motor was the most likely cause of the excessive amperage draw. The inspectors noted that the duty life for the pump motor based on the vendor technical manual was 15 years of equivalent continuous duty operation. The licensee determined that the pump motor had an equivalent run time of over 24 years, which was in excess of its maximum duty life. The inspectors noted that the licensee classified the essential chiller oil pumps as high critical components. However, the licensee treated the pumps as run-to-failure because the licensee did not have a preventative maintenance schedule to replace the pump periodically prior to the end of the motor's duty life. Additionally, the inspectors noted that there were no inspections or monitoring in place to establish trending to allow the licensee to predict the end of life for the oil pump motor. The licensee did not develop a preventative maintenance schedule to inspect or replace the essential chiller oil pump motors prior to exceeding their duty life. As a result, the essential chiller oil pump B motor failed in-service. Technical Specification 6.8.1.a requires, in part, that procedures shall be established, implemented, and maintained covering "the applicable procedures recommended in Appendix A of Regulatory Guide 1.33, Revision 2." Section 9.b. of Regulatory Guide 1.33, Revision 2, Appendix A, recommends, in part, that preventative maintenance schedules should be developed to specify lubrication schedules, inspection of equipment, and inspection or replacement of parts that have a specific lifetime. Contrary to the above, prior to January 8, 2014, the licensee failed to develop, preventative maintenance schedules to specify inspection or replacement of parts that have a specific lifetime as recommended in Regulatory Guide 1.33, Revision 2, Appendix A.

Quad Cities, Inspection Report 2015001, April 29, 2015: On January 6, 2015, an electrical maintenance worker found a tripped breaker in motor control center (MCC) 28–1, for the Unit 2 power feed to the common unit (Unit 0) fuel oil transfer pump (FOTP). The licensee determined that an HGA relay in the FOTP power transfer circuit had failed due to aging and not having any associated preventive maintenance task. One of the conclusions of the analysis stated that the "overall condition of the relay and contacts suggest that the relay may have reached end of life." The licensee also determined that neither the panel where the relay was located nor the relay have specified preventive maintenance tasks, including no specified replacement frequency. The HGA relay that failed was a General Electric Model 12HGA11H70 relay. The licensee was unable to identify any documentation specifying the service life for this relay. The licensee provided the inspectors with the station's generic performance centered maintenance (PCM) template. The PCM template indicated that HGA100 Series relays had a service life of >80 years. However, the inspectors identified that the HGA relay that failed was an older model than the 100 series relay to which the PCM template refers. Therefore, the PCM template was not applicable for this component. The inspectors identified several additional problems with applying the PCM template to this relay. The station's PCM template was based on information contained in the Electric Power Research Institute (EPRI) Report 3002000541, "Relay Series–Specific Guidance: Generic Service Life Analyses (GSLA) and Preventive Maintenance (PM) Templates." The report indicated that it was "only applicable to certain vintage relays… that have been evaluated in this analysis. Prior to applying

this analysis to relays that are installed… a similarity evaluation should be performed since changes in configuration or materials of construction could affect the established service life of these relays." The licensee had not performed a similarity evaluation to address material and configuration changes prior to applying the analysis contained in the EPRI report to their PCM template for the failed relay model (12HGA11H70). In addition, EPRI Report 3002000541 stated, "Relays mounted in small non-ventilated boxes need to be analyzed based on actual service conditions, i.e., they are not addressed in this evaluation." The failed relay was mounted in panel 2212–50, which was a small non-ventilated box. Finally, the inspectors noted that the EPRI report cited by the licensee's PCM template stated, "The service lives established in this evaluation assume that all recommended preventive maintenance, inspections and surveillances are performed as intended." Because the licensee did not perform any preventive maintenance on the associated relay or panel, the PCM template was not applicable for the failed relay. In addition, the inspectors noted that the PCM template was inconsistent with and less conservative than applicable vendor documents. The inspectors determined the licensee failed to establish and maintain the service life for the FOTP HGA relay, which was a performance deficiency. A finding of very low safety significance (Green) and associated NCV of 10 CFR 50, Appendix B, Criterion III, Design Control, was self-revealed.

Ft Calhoun, Inspection Report 2015007, April 16, 2015: Prior to March 12, 2015, the licensee failed to verify or check the adequacy of the reactor protective system power supplies: 1) service life as a function of expected life minus shelf life; 2) vendor requirements for in-storage and post-storage maintenance; and 3) including or addressing laboratory failure analysis conclusions that a required component was, although functional, at its end of life after 18 years. The licensee considered the electrolytic capacitor as the bounding component in the power supply's expected life. The vendor recommendation that the service life is equal to the expected life minus shelf life was cited several times in the evaluation, however, an assumption was made that the capacitor expected life equaled the service life of the power supply. The team was concerned that this ignored shelf life in the licensee's warehouse, and potentially at the capacitor manufacturer and/or power supply vendor; which could result in power supplies installed in the plant that are beyond the vendor recommendation for service life. The licensee failed to perform an adequate justification for continued operation for reactor protective system power supplies that were beyond vendor recommended life. The team identified a Green, non-cited violation of 10 CFR Part 50, Appendix B, Criterion III, Design Control, which states, in part, design control measures shall provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program.

Prairie Island, Inspection Report 2013005, February 7, 2013: The licensee failed to implement vendor recommendations to replace rubber hoses on the emergency diesel generators (EDGs) at a 10-year frequency. Specifically, some of the installed rubber hoses were found to be in service beyond the vendor recommended service life and if they were to degrade, could impact the safety-related functions of the EDGs. The inspectors identified a finding of very low safety significance and an NCV of 10 CFR Part 50, Appendix B, Criterion III, Design Control, due to the licensee's failure to implement vendor recommendations to replace rubber hoses on the emergency diesel generators (EDGs) at a 10-year frequency.

Sequoyah, May 9, 2013: On August 16, 2012, Unit 2 automatically tripped from 100 percent power due to a low reactor coolant system flow condition. The low flow condition was caused by a loss of the Loop No. 4 RCP due to a spurious trip of the pump's circuit breaker. Subsequent troubleshooting revealed that a 250 volt relay, GR-5, was providing a standing trip signal to the RCP circuit breaker. The GR-5 relay is used on the 6.9 kV Unit and Shutdown boards for ground fault protection. The root cause team discovered that the failure mechanism of the relay was due to a faulted Metal Oxide Varistor (MOV) which is internal to the relay itself. The component appeared to reach the end of its service life. According to the EPRI templates, the service life is listed as 8 to 10 years for solid state protective relays. The licensee's root cause team noted that preventative maintenance procedure did not provide guidance to replace the relay once the service life of the component had been reached. Additionally, the established preventative maintenance procedure was only performed once per 15 years which also was beyond the service life of the relay. Unit 2 TS 6.8.1.a requires, in part, that written procedures be established, implemented, and maintained covering the activities specified in Appendix A, "Typical Procedures for Pressurized Water Reactors and Boiling Water Reactors," of Regulatory Guide (RG) 1.33, "Quality Assurance Program Requirements (Operations)," Revision 2, dated February 1978. RG 1.33 Appendix A Section 9.a, "Procedures for Performing Maintenance," required, in part, maintenance that can affect the performance of safety related equipment should be properly pre-planned and performed in accordance with written procedures, documented instructions, or drawings appropriate to the circumstances. No maintenance procedures were developed to periodically replace this relay. Failure to perform adequate preventative maintenance (e.g. periodic relay replacement) on the GR-5 relay at proper intervals was a performance deficiency. A self-revealing Green NCV of Unit 2 Technical Specification (TS) 6.8.1, Procedures & Programs, was noted for the licensee's failure to provide adequate procedures for maintenance and surveillance activities involving the RCP circuit breaker ground fault relay, GR-5.

Industry Concerns

TIA 2014-01 Establishes a New Staff Position which Characterizes Vendor Replacement and Refurbishment Recommendations as 50.2 Design Bases or Supporting Design Information.

The industry agrees that vendor information such as vendor correspondence, vendor manuals or Certificates of Compliances can contain information that should be considered when evaluating the replacement or refurbishment interval of an SSC. However, the industry does not agree that this vendor information is design bases information as defined in 10 CFR 50.2 or supporting design information as defined in NEI 97-04, Design Bases Program Guidelines, Revision 1. It then follows that, it is the industry position that the TIA should not conclude that a nonconformance exists when vendor recommended replacement or refurbishment intervals are exceeded, without consideration of other factors, and the operability/functionality process may not be required.

The Task Interface Agreement Regulatory and Technical Analysis begins by discussing Criterion III, Design Control, of 10 CFR 50 Appendix B. The NRC analysis restates a design control requirement of Criterion III that applies to the design of structures, systems, and components (SSC). This requirement is, "Measures shall also be established for the selection and review for suitability of application of materials, parts, equipment and processes that are essential to the safety-related functions of structures, systems, and

components." The TIA analysis states that, "Licensee's NRC-approved Quality Assurance Programs provide the plant-specific applications of Criterion III. A critical element in the selection of safety-related SSCs is the determination of how long an installed SSC can be relied upon to perform its specified safety function. The determination is then documented in accordance with the licensee's NRC-approved Quality Assurance Program implementation of 10 CFR 50, Appendix B."

While Criterion III is applicable to the design of structures, systems, and components, the NRC analysis makes an incorrect association between inputs that must be considered during the design of SSCs, and regulatory requirements for maintenance of those SSCs during plant operation. The NRC Regulatory and Technical Analysis does not discuss the Regulatory Guidance and NRC-approved standards that provide the quality assurance requirements for maintenance of safety-related SSCs. The differences in these requirements are discussed below.

10 CFR 50 Appendix B, Criterion III, Design Control, states, "Measures shall be established to assure that applicable regulatory requirements and the design basis, as defined in § 50.2 and as specified in the license application, for those structures, systems, and components to which this appendix applies are correctly translated into specifications, drawings, procedures, and instructions. These measures shall include provisions to assure that appropriate quality standards are specified and included in design documents and that deviations from such standards are controlled. Measures shall also be established for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the structures, systems and components." Clearly, Criterion III, Design Control, requires a design control program be implemented that provides assurance that materials, parts, and components are reviewed, during the design process, for suitability of application, and selected for the design based on the results of the review process. This process may include component aging, related testing, and other vendor information regarding the reliability of components, but the TIA incorrectly concludes that these considerations for the design selection process are 10 CFR 50.2 Design Bases or Supporting Design Bases information (as defined in NEI 97-04, Revision 1) that requires prescriptive component replacements under the licensee's maintenance program. The TIA, incorrectly equates vendor replacement or refurbishment interval recommendations to design basis or supporting design information as defined by 10 CFR 50.2 and NEI 97-04, Revision 1, respectively.

Implementing guidance for design processes treats the selection and review for suitability of an SSC as an input or consideration accounted for in the design process of safety related SSCs. For example, ASME NQA-1-1994, Appendix 3A-1, "Non-mandatory Guidance on Design Control" describes design inputs that should be considered and include shelf or service life limitations. While it is recognized that this is a an important input to the design process, there is no supporting regulatory guidance or endorsed standard that would either mandate determination or establishment of vendor replacement or refurbishment recommendations as a controlling parameter for design bases functional requirements for SSCs in mild environments. Unless mandated by regulation, this input is considered to be design process consideration, but not a design base value that represents a requirement for the performance of intended SSC functions (NEI 97-04, Revision 1). This information is used to determine the appropriate equipment that will be procured and then it serves as one of many inputs in the maintenance strategy

while in operation. Characterizing vendor replacement or refurbishment information as design bases or supporting design information is inconsistent with NEI 97-04, Revision 1, Appendix B.

TIA 2014-01 Establishes a New Staff Position Regarding Existing Quality Assurance Program Requirements for Maintenance Programs During the Operational Phase

The industry believes that regulatory requirements and NRC endorsed quality assurance program standards do not require licensees to strictly adhere to vendor recommendations or formally evaluate deviations from those recommendations under the licensee's Appendix B quality assurance program. With that said, the industry agrees that failures to establish or maintain appropriate maintenance schedules should be characterized as violations of 10 CFR 50 Appendix B, Criterion V and Regulatory Guide 1.33, Revision 2.

Regulatory Guide 1.33, Revision 2, Quality Assurance Program Requirements (Operation), Regulatory Position states that, "The overall quality assurance program requirements for the operation phase that are included in ANSI N18.7-1976/ANS-3.2 are acceptable to the NRC staff and provide an adequate basis for complying with the quality assurance program requirements of Appendix B to 10 CFR Part 50," subject in part, to the procedures listed in Appendix A, Typical Procedures for Pressurized Water Reactors and Boiling Water Reactors. Appendix A, Number 9, Procedures for Performing Maintenance, 9.b states, "Preventive maintenance schedules should be developed to specify lubrication schedules, inspections of equipment, replacement of such items as filters and strainers, and inspection or replacement of parts that have a specific lifetime such as wear rings." ANSI N18.7-1976, Section 5.2.7.1, Maintenance Programs, requires that a maintenance program be developed to maintain safety related structures, systems and components at the quality required for them to perform their intended safety functions. Section 5.2.7.1 states, "As experienced is gained in operation of the plant, routine maintenance should be altered to improve equipment performance. A preventive maintenance program shall be established and maintained which prescribes the frequency and type of maintenance to be performed. A preliminary program based on service conditions and experience with comparable equipment should be developed prior to fuel loading. The program should be revised and updated as experience is gained with equipment. "

Neither Regulatory Guide 1.33, Revision 2, nor ANSI N18.7-1976 require replacement of parts or components specifically based on vendor recommendations or test results provided as part of the design selection process of 10 CFR 50 Appendix B. Instead, both documents require development of maintenance schedules. The maintenance program guidance in ANSI N18.7-1976 provides additional requirements that the preliminary maintenance program be based on service conditions and experience with similar equipment. The requirements for the maintenance program are that it be revised and updated to improve performance as experienced is gained with the equipment, and that appropriate corrective actions are taken for malfunctioning equipment. The TIA Regulatory and Technical Analysis does not acknowledge that industry long-standing, existing maintenance program quality assurance

requirements are based on a collective industry knowledge of service recommendations, component history, and industry experience, for determining replacement and refurbishment intervals. Additionally, neither the regulatory guide nor the ANSI standard requires licensees to conduct formal evaluations when altering maintenance schedules.

Licensee's 10 CFR 50 Appendix B quality assurance programs include controls for ensuring the maintenance programs maintain safety-related structures, systems and components. Maintenance programs are required by Regulatory Guide 1.33, Revision 2. However, the Final TIA Regulatory and Technical Analysis does not discuss that the NRC-approved licensee's quality assurance program includes NRC Regulatory Guide 1.33, Revision 2, and NRC endorsed standard ANSI N18.7-1976. Neither Regulatory Guide 1.33, Revision 2, nor ANSI N18.7-1976 require evaluation of, or make reference to, vendor correspondence, vendor manuals, or certificates of compliance, in the licensee's process for determining maintenance schedules.

The adequacy of existing quality assurance requirements for preventive maintenance programs is substantiated by the fact that the requirements for these programs have remained largely the same through the years. NQA-1-1994, Subpart 2.18, Section 3, Preventive Maintenance, states that, "Plans and procedures shall be developed to identify the equipment which requires preventive maintenance, to establish the frequency and kind of preventive maintenance to be performed on the equipment, and to document those actions." Section 3.2.1, Equipment, requires that, "Equipment shall be evaluated to determine its prevent maintenance requirements. That evaluation shall include the vendor recommendations as delineated in their Technical Manual and Bulletins, applicable industry standards and operational experience, and maintenance experience and equipment history files. Equipment shall be monitored and evaluated for degradation of performance because of age, as appropriate." Section 3.2.3 states that, "The effectiveness of preventive maintenance actions on equipment shall be evaluated. The evaluation results shall be documented and be the basis for future preventive maintenance practices." Section 2.8, Updating of Maintenance Procedures from Vendor Technical Manuals and Industry Bulletins, states, "Controls shall ensure that updated information (vendor technical manuals, industry bulletins, etc.) is received, reviewed, and incorporated where appropriate into maintenance procedures." And last, it is important to recognize that Section 5.0, Records, does not require records of evaluations of deviations from vendor recommendations.

Based on this review of the quality assurance program regulatory documents and implementing standards, the quality program implementing standards have remained consistent in the requirement to consider vendor recommendations, but also to base preventive maintenance schedules on experience gained in operation of the equipment and industry experience. Additionally, there has not been any requirement to document evaluations of deviations from vendor recommended preventive maintenance or part replacements.

TIA 2014-01 Changes Existing NRC Positions on Preventive Maintenance Requirements for Equipment in Mild Environments

The absence of a regulatory requirement for licensees to formally document evaluations of deviations from vendor recommendations is further substantiated by review of existing NRC comments and

positions regarding the requirements for maintaining qualifications of SSCs that must operate in harsh environments.

Preventive maintenance requirements for components qualified for harsh environments to meet 10 CFR 50.49 are in addition to the quality assurance standards discussed above for all SSC's. Components qualified for harsh environments are a subset of safety-related SSC's. This is confirmed by 10 CFR 50.49(c)(3) which states that, "Environmental qualification of electric equipment important to safety located in a mild environment are not included within the scope of this section. A mild environment is an environment that would at no time be significantly more severe than the environment that would occur during normal plant operation, including anticipated operational occurrences." The context of this regulation means that the qualification of components in a harsh environment must be maintained by performing the maintenance specified to maintain that qualification, beyond the maintenance required by the Appendix B program requirements for equipment in a mild environment. This is required because this subset of components may be subjected to a design basis environment that could cause accelerated aging and degradation while age related degradation of components in a mild environment would not be accelerated during design basis conditions and component aging related degradation can be detected during normal plant operations.

Review of the Statements of Consideration in Federal Register, 48FR2733, January 21, 1983, for the 10 CFR 50.49 Final Rule supports the discussion above. For equipment in a mild environment, the following issue was addressed as follows:

> (3) Scope – Equipment in a Mild Environment – Paragraph 50.49(b)
>
> Issue: The rule makes no distinction between equipment located in a harsh or mild environment. The stresses for equipment in a mild environment are less severe than for those in a harsh environment.
>
> Response: The final rule does not cover electrical equipment located in a mild environment. The Commission has concluded that the general quality and surveillance requirements applicable to electrical equipment as a result of other Commission regulations, including 10 CFR Part 50 Appendix B (see for example, Regulatory Guide 1.33, 'Quality Assurance Program Requirements (Operation), Revision 3') are sufficient to ensure adequate performance of electric equipment important to safety located in mild environments. Since it has been concluded that no further environmental qualification requirements are needed for such equipment provided they fully satisfy all other applicable regulations, the Commission has determined that no additional requirements are necessary with respect to electric equipment important to safety located in mild environments in order for licenses to satisfy, with respect to such equipment, existing license conditions or technical specifications calling for qualification of safety-related electric equipment in accordance with DOR Guidelines or NUREG-0588.

This response clearly states that no additional requirements are necessary (i.e., above and beyond those provided by Regulatory Guide 1.33). The difference is that part or component replacements may be required to maintain the harsh environment qualification of the equipment based on qualification test results, so that it can performed its design function. But, there are no requirements in this regard for

equipment that was not required to be qualified for harsh environments. This is supported by NUREG-0800 discussed below.

NUREG-0800, Standard Review Plan, Revision 2, July 1981, Section 3.11, "Environmental Qualification," states for components in Mild Environments:

> The environmental qualification of all electrical and mechanical equipment located in the mild environment is acceptable if the following procedure is followed:
>
> The documentation required to demonstrate qualification of equipment in a mild environment are the 'Design/Purchase' specifications. The specifications shall contain a description of the functional requirements for its specific environmental zone during normal and abnormal environmental conditions. A well supported maintenance/surveillance program in conjunction with a good preventive maintenance program will suffice to assure that equipment that meets the design/purchase specifications is qualified for the designed life.
>
> Furthermore the maintenance/surveillance program data and records shall be reviewed periodically (not more than 18 months) to ensure that the design qualified life has not suffered thermal and cyclic degradation resulting from the accumulated stresses triggered by the abnormal environmental conditions and the normal wear due to its service condition. Engineering judgment shall be used to modify the replacement program and/or replace the equipment as deemed necessary.

Two points are particularly important in this NRC regulatory document. The first is that the Standard Review Plan shows that 10 CFR 50 Appendix B, Criterion III, is applicable to the design process by procurement of equipment under the design/purchase specification for components in a mild environment. In contrast to the TIA, these discussions make it clear that the design life qualification information is applicable to the design process through the procurement specifications. Second, it is clear that the NRC review criteria for preventive maintenance of these SSCs (required not by Criterion III but by Regulatory Guide 1.33) includes the requirement only for "engineering judgement" in order to modify the replacement program or replace equipment as necessary. The TIA contradicts this long-standing NRC regulatory position in that the TIA implies that these ongoing engineering decisions were required to be conducted formally under design control criterion associated with 10 CFR 50 Appendix B, and that there was a requirement to document these evaluations. Additional precedence on the NRC acceptance of engineering judgement with regard to requirements for making changes to vendor recommendations are found in Generic Letter 82-09.

In Generic Letter 82-09, "Environment Qualification of Safety-Related Electrical Equipment," the NRC responded to Topic 4 regarding the adequacy of maintenance programs for equipment in mild environments. The question states, "Can periodic surveillance, testing and maintenance programs adequately demonstrate qualification of electrical equipment in mild environments?" The response to this question states in part, "For existing equipment located in mild environments, equipment environmental qualification can be adequately demonstrated and maintained by the use of the following three programs: 1. A periodic maintenance, inspection, and/or replacement program based on sound engineering practice and recommendations of the equipment manufacturer which is updated as

required by the results of an equipment surveillance program." This NRC response also confirmed that sound engineering practices, not formal documented evaluations, are acceptable for the review of vendor recommendations which are updated by results of surveillance testing.

NRC Positions in TIA 2014-01 Have Not Been Reconciled with NRC Regulatory Requirements and Statements of Consideration in 10 CFR 50.65 for the Maintenance Rule.

The industry is concerned that NRC positions stated in the TIA are inconsistent with 10 CFR 50.65 and the supporting Statements of Considerations (SOC). The TIA does not acknowledge the performance based objectives of the Maintenance Rule that were put in place by the Commission to monitor the effectiveness of maintenance programs, intentionally without requiring prescriptive preventive maintenance activities.

In fact, the TIA does not discuss the relationship of NRC positions stated in the TIA with respect to requirements of 10 CFR 50.65 for the Maintenance Rule. The TIA does not address Maintenance Rule implementing guidance as described in Regulatory Guide 1.160 and NUMARC 93-01, Revision 4A, which provide a performance based, risk-informed method for monitoring the effectiveness of maintenance, to meet requirements of the Maintenance Rule.

In 1991, the NRC published the final rule for 10 CFR 50.65 in the Federal Register (FR 31306, Vol. 56, No. 132, July 10, 1991). The statements of consideration introduced the discussion by stating that, "The Commission is amending its regulations to require commercial nuclear power plant licensees to monitor the effectiveness of maintenance activities for safety significant plant equipment in order to minimize the likelihood of failures and events caused by the lack of effective maintenance." This new rule, as discussed in the SOC, was designed to factor risk into maintenance programs, and be performance based, relying not on programs to implement maintenance, but rather on the results of maintenance. The objective of the final rule was to "Require the monitoring of the overall continuing effectiveness of licensee maintenance programs to ensure that: (1) Safety related and certain non-safety related structures, systems, and components are capable of performing their intended functions; and (2) for non-safety related equipment, failures will not occur which prevent the fulfillment of safety-related functions, and failures resulting in scrams and unnecessary actuations of safety related systems are minimized." (p. 31308)

The TIA contradicts these principles of the Maintenance Rule by requiring licensees to in effect, arbitrarily conclude that maintenance of an SSC is ineffective if information provided by a vendor contradicts with a licensee's maintenance schedule for that SSC, in the absence of a documented evaluation that addresses any differences between the vendor information and the licensee's maintenance schedule. The TIA begins by explaining this as the problem in the Introduction which states, "During several inspections, the inspectors identified examples of structures, systems, and components (SSCs) that were in operation beyond the service life specified in vendor manuals, vendor correspondence or Certificates of Compliance." The Maintenance Rule objectives listed above for monitoring were put in place to ensure licensees maintained effective maintenance programs by monitoring the results of maintenance, not a single input to the overall maintenance program

considerations for an SSC, such as a vendor recommendation. This is substantiated by specific Commission considerations in the SOCs for the Maintenance Rule. In discussing the need for monitoring the performance of certain SSCs, the SOCs states this is required to, "Provide reasonable assurance that those SSCs will be capable of performing their intended functions. Such monitoring would take into account industry-wide operating experience." (p. 31306) Regarding the industry initiatives to improve maintenance programs, the Commission stated, "The Commission revised the rule to emphasize the effectiveness or result of maintenance programs and de-emphasize the programmatic aspects of maintenance. Also, in acknowledgement of the generally satisfactory state of maintenance programs the final rule provides great flexibility for the industry to continue developing, improving and implementing recommendations and guidance concerning maintenance programs. However, because the rule has been modified to de-emphasize programmatic requirements of maintenance, the Commission does not currently intend to formally endorse an industry maintenance program standard." (p. 31312) NRC positions stated in the TIA would have the effect of reversing this Commission direction for industry initiatives to develop, improve and implement recommendations for maintenance programs by requiring licensees to instead focus resources on the identification and evaluation of any deviations from vendor information, most of which is historical and not current with present day industry-wide OE and industry developed PM basis programs and maintenance schedules. Finally, the TIA is inconsistent with important considerations by the Commission that state, "The Commission projects that because the results-oriented rule is not a prescriptive programmatic rule, licensees will achieve some cost savings because they will have flexibility in determining the manner in which to improve the programmatic elements of their maintenance programs." (p. 31322)

One of the new requirements introduced by the Maintenance Rule was that licensees needed to recognize the risk of performing maintenance, and to balance the risk associated with reduced availability of SSCs with the need to perform maintenance. The SOCs for the rule state that, "Licensees will be required to evaluate the overall effectiveness of their maintenance programs on at least an annual basis, again taking into account industry-wide operating experience, and adjust their programs where necessary to ensure that the prevention of failures is appropriately balanced with the minimization of unavailability of SSCs." (p. 31306) In contradiction to this requirement to balance risk, the TIA states, "When a licensee becomes aware that a safety-related SSC's service life has been exceeded or information challenges the presumption that a safety-related SSC can perform its specified function(s), the licensee must promptly address and document this nonconforming condition in accordance with the licensee's NRC-approved Quality Assurance Program and the licensee's operability/functionality and corrective action programs." Based on the context of the TIA, the subject of this statement is referring to the discovery of information in vendor manuals, vendor correspondence, or Certificates of Compliance that contain recommended maintenance or component replacements. By requiring licensees to classify deviations from vendor recommendations as non-conformances, and in effect conclude that deviations from vendor recommendations directly result in increased failures of SSCs, the TIA contradicts the requirements of 10 CFR 50.65 to appropriately balance the risk of doing maintenance with the unavailability of the SSCs. This logic would result in increased unavailability of SSCs in order to perform maintenance that is based on only a single input in determining the need to perform that maintenance, and ignores the rule requirement to take into

account industry-wide OE. The NRC position documented in the TIA is also inconsistent with the NRC position documented in IP 62700, Paragraph 03.02a.2 which states, “While it is required for licensees to obtain and review vendor technical information, it is not required that all vendor recommendations be incorporated into the licensee's maintenance program. If the licensee determines that a vendor recommendation is not appropriate, the licensee may decide to disregard it.”

TIA 2014-01 Does Not Adequately Recognize Industry Use of the EPRI PM Basis Database Program as an Acceptable Method to Evaluate Maintenance Schedules in Accordance with Quality Assurance Program Requirements.

The industry believes that use of the EPRI PM Basis Database Program to establish or modify maintenance schedules for safety-related SSCs in Mild Environments meets quality assurance program requirements and Regulatory Guide 1.33, Revision 2, for maintenance programs. Use of the EPRI PM templates to account for functions of the SSC, site specific OE, service conditions and duty cycle, constitutes an evaluation that meets the requirements of the aforementioned regulations, standards and NRC positions, with regard to evaluating deviations from vendor replacement or refurbishment interval recommendations.

Following implementation of the Maintenance Rule, in November 1998, EPRI issued TR-106857, "Preventive Maintenance Basis Project Overview Report Update," to summarize the process used to establish PM templates for 39 component types. According to the EPRI report, prior to development of the PM basis program, preventive maintenance programs at US nuclear plants evolved from vendor recommendations to more flexible tasks that were intended to factor in plant service conditions. However, documentation of this evolution of the preventive maintenance programs may not have been complete. Therefore, utilities requested EPRI to provide technical basis and rationale for maintenance tasks associated with major component types and to support changes to them. The PM basis project provided utilities with the technical basis for tasks and intervals and provided information to modify the tasks and intervals to account for plant conditions and service conditions. These templates provide industry recommended maintenance strategies for the utilities to utilize as the bases for their components maintenance strategies. The templates are further evaluated utilizing the plants unique application and a maintenance strategy is developed and implemented based on the EPRI template and the utility unique application. PM Programs that use EPRI equipment specific templates to establish initial PM tasks and frequencies are inherently addressing age related degradation by performing maintenance tasks to address known failure modes. The processes for developing and evaluating the Maintenance Strategies are based on the industry programs listed in the References of this document.

The nuclear industry’s preventative maintenance programs are defined in INPO AP-913, “Equipment Reliability Process Description,” and EPRI 1002936, “Reliability and Preventative Maintenance: Balancing Risk and Reliability: For Maintenance and Reliability Professionals at Nuclear Power Plants.” These programs are based on accepted engineering fundamentals in equipment reliability as defined by the engineering sources listed at the end of this discussion. These sources define the engineering theories that form the foundation of the Industry Programs. For over 10 years, the industry with assistance with INPO, has worked to implement AP-913. A key to this process is equipment monitoring and

incorporation of industry-wide and site specific operating experience. In the Maintenance Rule, performance monitoring criteria is established based on risk inputs. If a degrading trend or repeat failures occur, adjustments are made to the maintenance strategy. Based on normal equipment monitoring and the periodic Maintenance Rule a(3) assessment, preventive maintenance programs are being adjusted continuously. These processes address more than just safety related components; in some instances, non-safety related components are more risk significant than safety related equipment. Preventive maintenance scope and frequency are based on numerous inputs and factors. Service conditions, duty cycles, and criticality or risk-significance of components must be considered. Time based replacement of components may be prudent or necessary in some instances where age-related degradation of materials is known to exist and consequences of failure are unacceptable.

NRC Positions Established in TIA 2014-01 Will Shift Maintenance Efforts to SSCs that are Less Risk-Significant.

The NRC positions in TIA 2014-01 will require that the industry treat all vendor replacement or refurbishment interval recommendations as design bases or supporting design information requirements. The effect of this approach is that the TIA will arbitrarily raise the importance of SSCs where vendor replacement or refurbishment interval information has been provided, and could result in non-conservative maintenance strategies that will introduce more opportunities for "Infant Mortality." This would drive unnecessary industry maintenance expenditures, diverting resources away from other needed expenditures and result in a compounded negative impact on plant reliability and safety. Expanding beyond current requirements and accepted industry practices has the potential to impact effective maintenance of equipment as time and resources are directed toward SSCs with artificially inflated risk significance. The NRC position stated in the TIA can be interpreted to require a level of proof that goes well beyond what is reasonable for the maintenance of most equipment. This could impose a significant new burden on stations and is counter to the risk-informed, graded approach required for successful management of equipment.

The TIA does not account for the graded approach to maintenance and equipment reliability based on safety significance and risk as it relates to the level of effort, documentation, and resources. The industry has established a coordinated effort to standardize equipment reliability processes. The foundation for this process is based on the scoping of components based on their functions importance to safety, reliability and generation. This strategy effectively prevents many challenges to safety systems as well as assuring the safety systems perform as required. The Reliability Centered Maintenance Programs, referenced at the end of this document, have been applied to most industrial programs. As indicated by the references, these include but are not limited to the defense, automotive, aircraft, oil and gas, and the nuclear industries. These programs first classify components based on their Function (Importance) and application (Duty Cycle and Environment). Figure 1 provides a general example of the failure rate profile of components over time. To ensure reliability of a component is maintained at a high level, based on its importance, it is key to recognize that wear out is only one of the failure mechanisms for equipment. Another very impactful failure rate is "Infant Mortality" that recognizes that the performance of maintenance or the installation of new part can result in failures. This is a key principle of industry accepted equipment reliability as excessive maintenance can result in

unacceptable failure rates equivalent to or exceeding those of age related mechanisms. The effectiveness of a maintenance program is, in part, based on demonstrating a reasonable assurance that the type and frequency of preventative maintenance is being performed based on safety significance of the SSC. This program intentionally expands well beyond safety related SSCs as there is a recognition that non-safety related equipment can have a critical role in the safety operation of the facility.

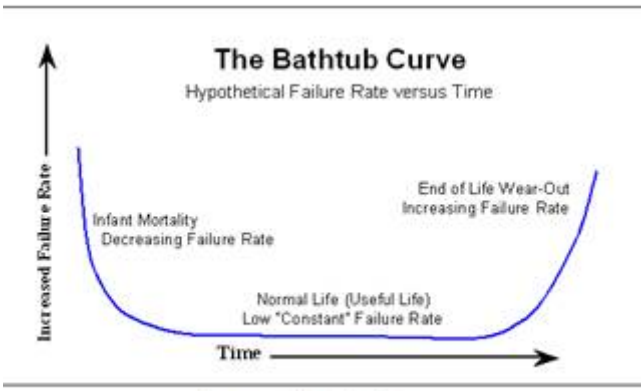

Figure 1: The Bathtub Curve

Trending of equipment performance, as-found condition monitoring and feedback are inherent in monitoring of equipment performance. This is used to optimize preventive maintenance strategies including replacement and refurbishment activities. The feedback from maintenance as-found condition assessments is used to increase, decrease or maintain the current maintenance frequencies as well as scope of the activities.

Equipment trending is established both horizontally and vertically. Component performance is trended in system specific and site-wide application of specific component types. Adverse trends are identified and action taken to prevent events. These monitoring and trending activities provide predictability of degradation mechanisms and timely corrective or mitigating actions. The population of failures included in trending does vary somewhat from station to station, but includes, at a minimum, the INPO Equipment Performance and Material Condition (EP&MC) failures as the population. These equipment issues are binned according to both failure mechanism as well as causes including organizational and programmatic contributors.

The industry recognizes that this is a self-regulating process. The requirements of AP-913 are voluntary, but are implemented across the U.S. nuclear fleet. Results of this equipment reliability process have improved the performance of SSCs. For example, High Pressure Safety Injection and Emergency AC Power unavailability has improved by 18% and 13%, respectively, since 2011 while improving reliability as measured by fault exposure. Changing current industry practices will reduce the availability of mitigating systems while exposing these same systems to maintenance induced failures due to infant mortality and other causes as compared to the current state.

As discussed previously, vender recommendations represent only one input into the determination of an effective maintenance strategy. In several nuclear applications, it has been recognized that because the nuclear application of some components are not subject to the same duty cycle or environment as the vender's client in general industry, the vender recommended replacements or refurbishment

intervals maybe significantly over-conservative. In addition, some vendor recommendations are not based on technical equipment issues, but are based on vendor business decisions to support nuclear safety related equipment. Recommendations from the vendor are normally provided; however, they may not be categorical, highly-definitive replacement or refurbishment interval information. In addition, a generic component vendor manual, that may have been developed for general industry use, is typically provided for equipment within the nuclear plant but it does not consider the specific application of the component (limited duty cycles or environment). For example, a standby safety pump only experiencing quarterly testing would require a significantly different maintenance strategy than a pump in continuous service. In addition, in many applications, condition based monitoring is being developed that allows much more accurate identification of when components are approaching end of life. These technologies again allow more effective maintenance strategies to be applied and result in an overall improvement in reliability of the component and function.

Each utility and the industry through several different industry organizations continuously evaluate industry failures to determine any emergent generic issues. These evaluations are performed by industry groups including INPO, Equipment Reliability Working Group (ERWG), and EPRI and explicitly identify negative trends in component failures that may warrant additional reviews. For example, in the past several years it has been recognized that relays were contributing to a larger percentage of critical component failures. As a result, the industry groups sponsored an EPRI Project to specifically evaluate the performance of relays and to perform extensive failure reviews and in some instances industry testing to determine the failure modes and failure mechanisms by relay manufacturer and model and from this information develop more effective maintenance strategies outside of any vender recommendations. This effort has resulted in a reduction in the failures directly related to relays in the past few years. In addition to these industry working groups, utilities continuously assess the equipment failures through Component and System Health Monitoring, Performance Monitoring and Proactive Maintenance (As Found Testing Results) that are evaluated to determine the effectiveness of the component line and system maintenance strategy.

All of these programs combine to establish an effective equipment reliability program that fully implements the reliability engineering standards defined in the industry referenced at the end of this document.

The “Backfitting Considerations” Section of TIA 2014-01 are Inadequate.

NRC COM-106 states, “During TIA concurrence reviews, the NRR staff should be sensitive to backfit concerns. If the TIA can reasonably be viewed as either new or different from a previously applicable staff position, the TIA PM and the NRR technical staff shall consult LIC-202 . . . and LIC-400 . . . for additional guidance. If it is determined that a TIA likely would constitute a backfit if applied to a licensee, then the TIA should indicate that and could address what might be the likely outcome of a backfit evaluation or backfit analysis, as applicable.”

With respect to backfitting, TIA 2014-01 simply concludes, “Resolution of this issue does not constitute a backfit because it does not involve a new or different position from a previously applicable staff

position. Specifically, the documented regulatory positions are based on existing regulations, policies, and guidance. In addition, the staff's positions do not establish new interpretations of such regulations or policies."

These three sentences amount to a circular conclusion that the positions included in the TIA do not constitute backfitting because they are not backfits. This discussion overlooks substantial backfitting concerns associated with the positions taken in the TIA.

The sole regulatory requirement discussed in the TIA is 10 CFR Part 50, Appendix B, Criterion III, which is quoted as stating: "Measures shall also be established for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the structures, systems and components." Although this provision certainly requires the licensee to develop measures to ensure the suitability of materials, parts, equipment and processes that are essential to safety-related functions as described earlier in this document, it does not address the much more specific question of how vender replacement or refurbishment interval recommendations for equipment to be operated in mild environments must be managed by licensees. Further, while the generic letters discussed in the TIA led to the development of vendor interface programs, these generic letters did not require that vendor replacement or refurbishment interval information be considered design bases or supporting design bases information by licensees that must be managed under Criterion III of Appendix B, or otherwise elevate vendor information to the level of plant technical specifications.

To the contrary, Generic Letter 90-03 explicitly recognizes that:

> [V]endors may not always be in the best position to analyze a failure because they may not be aware of the components' application, environment or maintenance history. Therefore, we conclude that the elements of [Vendor Equipment Technical Information Program] provide a framework to improve the quality and availability of equipment technical information for use by utility licensees.

Thus, it appears that the goal of the programs responding to the Generic Letters was to improve the quality and availability of vendor information, but to leave decisions about how that information would be used to the licensee. In addition, the TIA does not address several other regulatory documents that are directly relevant to the implementation of licensee quality assurance requirements, such as Regulatory Guide 1.33, "Quality Assurance Regulatory Requirements (Operation)," and the ANSI standards referenced in that document. These new staff positions raise backfitting concerns that should have been addressed in the TIA and must be addressed in any subsequent generic communication adopting the positions contained in the TIA.

Industry Positions and Recommendations:

In summary, the following industry positions are proposed to address concerns regarding vendor replacement or refurbishment intervals of safety related SSCs:

- Deviations from vendor correspondence, vendor manuals or Certificates of Compliance regarding replacement or refurbishment intervals are acceptable under licensees' quality

assurance programs, which address development and modification of maintenance schedules during the operational phase, when licensees have implemented other programs for development of preventive maintenance schedules including the EPRI PM Bases Database Program.

- A nonconformance does not exist based only on the identification of safety related SSCs that are in operation for periods of time greater than the vendor recommended replacement or refurbishment intervals provided in vendor correspondence, vendor manuals or Certificates of Compliance.
- Licensees are required to develop and maintain maintenance schedules in accordance with the requirements of 10 CFR 50 Appendix B, Criterion V, Regulatory Guide 1.33, and the licensee's quality assurance program. Regulatory concerns should address the licensee's compliance with these requirements because vendor correspondence, vendor manuals or Certificates of Compliance related to replacement or refurbishment intervals are not 10 CFR 50.2 design bases or supporting design information.
- Licensees' reviews of the effectiveness of maintenance required by the Maintenance Rule should evaluate modifications to maintenance schedules to address unacceptable failures of safety related SSCs.

References:

1. F. S. Nowlan, and H. F. Heap, “Reliability Centered Maintenance.” National Technical Information Service Report No. AD/A066-579, December 1978.

2. F. S. Nowlan and H. F. Heep, “Reliability-Centered Maintenance.” Department of Defense Report AD-A066579, 1978.

3. Reliability-Centered Maintenance Requirements for Naval Aircraft, Weapons Systems, and Support Equipment. MIL-STD 2173(AS), U.S. Naval Air Systems Command.

4. Evaluation Criteria for Reliability Centered Maintenance (RCM) Processes. SAE Standard JA1011, August 1999. Society of Automotive Engineers, Warrendale, PA.

5. J. Mowbray. RCM II, Reliability-centered Maintenance. Industrial Press, 1997.

6. A. M. Smith. Reliability-Centered Maintenance. McGraw-Hill, 1993

7. R. B. Abernethy, The New Weibull Handbook, Fourth Edition. Gulf Publishing, 2000.

8. H. Procaccia, S. Arsenis, P. Aufort, and G. Volta. European Industry Reliability Data Bank. Crete University Press, 1998.

9. TUD Reliability, Maintenance, and Operation Database. TUD Office, SwedPower AB, P.O. Box 527, SE-162 16 Stockholm, Sweden.

10. Verlag Technisch-Wissenschaftlicher Schriften. VGB PowerTech Service GmbH, Postfach 10 39 32, D-45039 Essen, Germany.

11. A. Villemeur. Reliability, Availability, Maintainability, and Safety Assessment, Volume 1 Methods and Techniques. John Wiley and Sons, 1991.

12. Mann, Schafer, and Singpurwalla. Methods for Statistical Analysis and Life Data. John Wiley, 1974.