July 28, 2005

Mr. Britt T. McKinney
Sr. Vice President and
Chief Nuclear Officer
PPL Susquehanna, LLC
769 Salem Blvd., NUCSB3
Berwick, PA 18603-0467

SUBJECT: SUSQUEHANNA STEAM ELECTRIC STATION, UNITS 1 AND 2 - THIRD 10-YEAR INSERVICE INSPECTION (ISI) INTERVAL PROGRAM PLAN (TAC NOS. MC1181 AND MC1182)

Dear Mr. McKinney:

By letter dated September 16, 2003, as supplemented on September 16 and November 3, 2004, and May 6, 2005, PPL Susquehanna, LLC (PPL, the licensee), submitted a relief request (RR), 3RR-01, for Susquehanna Steam Electric Station, Units 1 and 2 (SSES 1 and 2), proposing alternatives to the requirements of Title 10 of the *Code of Federal Regulations*, Part 50, Section 55a (10 CFR 50.55a), concerning the requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) for its Third 10-Year ISI Program Plan.

The Nuclear Regulatory Commission (NRC) staff has reviewed PPL's regulatory and technical analysis in support of its requests for relief for 3RR-01. The application dated September 16, 2003, also requested 9 other relief requests for its Third 10-Year Interval ISI Program Plan. The NRC completed its review of 3RR-03, 3RR-07, 3RR-08, 3RR-09, 3RR-10, and 3RR-11 in a safety evaluation (SE) dated September 24, 2004 (ADAMS Accession No. ML042680078). The NRC also completed its review of 3RR-02, 3RR-04, and 3RR-06 in an SE dated February 1, 2005 (ADAMS Accession No. ML050320250).

PPL is currently in its Third 10-Year Interval ISI Program Plan which began on June 1, 2004, and will end on May 31, 2014. The ISI Code of record for the Third 10-Year Interval for SSES 1 and 2 is the 1998 Edition with the 2000 Addenda of the ASME Code, Section XI.

Based on the information provided by PPL, the NRC staff concludes that PPL's proposed alternatives for 3RR-01 provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the NRC staff authorizes the proposed alternatives for 3RR-01 as described in PPL's letter dated September 16, 2003, for SSES 1 and 2 for the Third 10-Year ISI Interval.

If you have any questions, please contact the project manager, Rich Guzman, at (301) 415-1030.

Sincerely,

/RA/

Richard J. Laufer, Chief, Section 1
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-387 and 50-388

Enclosure: As stated

cc w/encl: See next page

If you have any questions, please contact the project manager, Rich Guzman, at (301) 415-1030.

Sincerely,

/RA/

Richard J. Laufer, Chief, Section 1
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-387 and 50-388

Enclosure: As stated

cc w/encl: See next page

<u>DISTRIBUTION</u>:

PUBLIC	PDI-1 RF	RLaufer	RGuzman	MO'Brien	CHolden
OGC	ACRS	GHill (2)	MMelnicoff	RDavis	SLee, RI
SDinsmore	TChan	MRubin	MShanbaky, RGN-I	DLPM DPR	

ACCESSION NO.: ML051990330 *SE provided by memo. No substantive changes made.

OFFICE	PDI-1/PM	PDI-2/LA	EMCB/SC*	SPSB/SC*	OGC	PDI-1/SC
NAME	RGuzman	SLittle for MO'Brien	TChan	MRubin	TSmith	RLaufer
DATE	7/19/05	7/25/05	7/14/05 SE DTD	7/14/05 SE DTD	7/21/05	7/28/05

OFFICIAL RECORD COPY

Susquehanna Steam Electric Station, Units 1 and 2

cc:

Robert A. Saccone
General Manager - Nuclear Operations
PPL Susquehanna, LLC
769 Salem Blvd., NUCSB3
Berwick, PA 18603-0467

Aloysius J. Wrape, III
General Manager - Performance
Improvement and Oversight
PPL Susquehanna, LLC
Two North Ninth Street, GENPL4
Allentown, PA 18101-1179

Terry L. Harpster
General Manager - Plant Support
PPL Susquehanna, LLC
769 Salem Blvd., NUCSA4
Berwick, PA 18603-0467

Richard D. Pagodin
General Manager,
Nuclear Engineering (Acting)
PPL Susquehanna, LLC
769 Salem Blvd., NUCSB3
Berwick, PA 18603-0467

Rocco R. Sgarro
Manager - Nuclear Regulatory Affairs
PPL Susquehanna, LLC
Two North Ninth Street, GENPL4
Allentown, PA 18101-1179

Walter E. Morrissey
Supervising Engineer
Nuclear Regulatory Affairs
PPL Susquehanna, LLC
769 Salem Blvd., NUCSA4
Berwick, PA 18603-0467

Michael H. Crowthers
Supervising Engineer
Nuclear Regulatory Affairs
PPL Susquehanna, LLC
Two North Ninth Street, GENPL4
Allentown, PA 18101-1179

Steven M. Cook
Manager - Quality Assurance
PPL Susquehanna, LLC
769 Salem Blvd., NUCSB2
Berwick, PA 18603-0467

Luis A. Ramos
Community Relations Manager,
Susquehanna
PPL Susquehanna, LLC
634 Salem Blvd., SSO
Berwick, PA 18603-0467

Bryan A. Snapp, Esq
Assoc. General Counsel
PPL Services Corporation
Two North Ninth Street, GENTW3
Allentown, PA 18101-1179

Supervisor - Document Control Services
PPL Susquehanna, LLC
Two North Ninth Street, GENPL4
Allentown, PA 18101-1179

Richard W. Osborne
Allegheny Electric Cooperative, Inc.
212 Locust Street
P.O. Box 1266
Harrisburg, PA 17108-1266

Director - Bureau of Radiation Protection
Pennsylvania Department of
Environmental Protection
P.O. Box 8469
Harrisburg, PA 17105-8469

Senior Resident Inspector
U.S. Nuclear Regulatory Commission
P.O. Box 35, NUCSA4
Berwick, PA 18603-0035

Regional Administrator, Region 1
U.S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, PA 19406

Susquehanna Steam Electric Station, Units 1 and 2

cc:

Board of Supervisors
Salem Township
P.O. Box 405
Berwick, PA 18603-0035

Dr. Judith Johnsrud
National Energy Committee
Sierra Club
443 Orlando Avenue
State College, PA 16803

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO RELIEF REQUEST NO. 3RR-01

FOR THE INSERVICE INSPECTION PROGRAM PLAN FOR THE THIRD 10-YEAR

INSPECTION INTERVAL PER THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

BOILER AND PRESSURE VESSEL CODE, SECTION XI, REQUIREMENTS

PPL SUSQUEHANNA, LLC

ALLEGHENY ELECTRIC COOPERATIVE, INC.

SUSQUEHANNA STEAM ELECTRIC STATION, UNITS 1 AND 2

DOCKET NOS. 50-387 AND 50-388

1.0 INTRODUCTION

By letter dated September 16, 2003 (Agencywide Documents and Access Management System (ADAMS) Accession No. ML032670839), as supplemented on September 16 (ML042710272) and November 3, 2004 (ML043220375), and May 6, 2005 (ML051370346), PPL Susquehanna, LLC (PPL, the licensee), submitted a relief request (RR), 3RR-01, for Susquehanna Steam Electric Station, Units 1 and 2 (SSES 1 and 2), proposing alternatives to the requirements of Title 10 of the *Code of Federal Regulations*, Part 50, Section 55a (10 CFR 50.55a), concerning the requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) for its Third 10-Year Inservice Inspection (ISI) Program Plan.

The application dated September 16, 2003, also requested 9 other relief requests for its Third 10-Year Interval ISI Program Plan. The Nuclear Regulatory Commission (NRC) completed its review of 3RR-03, 3RR-07, 3RR-08, 3RR-09, 3RR-10, and 3RR-11 in a safety evaluation (SE) dated September 24, 2004 (ADAMS Accession No. ML042680078). The NRC later completed its review of 3RR-02, 3RR-04, and 3RR-06 in an SE dated February 1, 2005 (ADAMS Accession No. ML050320250).

PPL is currently in its Third 10-Year ISI interval which began on June 1, 2004, and will end on May 31, 2014. The ISI ASME Code of record for the third 10-Year interval for SSES 1 and 2 is the 1998 Edition with the 2000 Addenda of the ASME Code, Section XI.

2.0 REGULATORY EVALUATION

Pursuant to 10 CFR 50.55a(g), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements set forth in the ASME Code to the extent practical within the limitations of design, geometry, and materials of construction of the components. 10 CFR

50.55a(g) also states that ISI of the ASME Code Class 1, 2, and 3 components is to be performed in accordance with Section XI of the ASME Code and applicable addenda, except where specific written relief has been granted by the NRC. The objective of the ISI program as described in Section XI of the ASME Code and applicable addenda is to identify conditions (i.e., flaw indications) that are precursors to leaks and ruptures in the pressure boundary of these components that may impact plant safety.

The regulations also require that, during the First 10-Year ISI Interval and during subsequent intervals, the licensee's ISI program complies with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference into 10 CFR 50.55a(b), 12 months prior to the start of the 120-month Interval, subject to the limitations and modifications listed therein. SSES 1 and 2 are in the Third 10-Year ISI Interval. This interval started on June 1, 2004, for both units. Hence, the applicable edition of Section XI of the ASME Code for SSES 1 and 2 for this 10-Year ISI Interval is the 1998 Edition with 2000 Addenda.

Pursuant to 10 CFR 50.55a(a)(3), the NRC may authorize alternatives to the requirements of 10 CFR 50.55a(g), if an applicant demonstrates that the proposed alternatives would provide an acceptable level of quality and safety, or that the specified requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Regulatory Guide (RG) 1.174, "An Approach for Using Probabilistic Risk Assessment In Risk-Informed [RI] Decisions On Plant-Specific Changes to the Licensing Basis," defines the following safety principles that should be met in an acceptable RI-ISI program:

1. The proposed change meets current regulations unless it is explicitly related to a requested exemption.

2. The proposed change is consistent with the defense-in-depth philosophy.

3. The proposed change maintains sufficient safety margins.

4. When proposed changes result in an increase in risk, the increases should be small and consistent with the intent of the Commission's Safety Goal Policy Statement.

5. The impact of the proposed change should be monitored using performance measurement strategies.

RG 1.178, "An Approach For Plant-Specific Risk-Informed Decisionmaking - Inservice Inspection of Piping," describes methods acceptable to the NRC staff for integrating insights from probabilistic risk assessment (PRA) techniques with traditional engineering analyses into ISI programs for piping, and addresses risk-informed approaches that are consistent with the basic elements identified in RG 1.174.

PPL has proposed to use an RI-ISI program for ASME Class 1 and Class 2 piping (Examination Categories B-F, B-J, C-F-1, and C-F-2 welds), as an alternative to the ASME Code, Section XI requirements. PPL states that this proposed program was developed using the RI-ISI methodology described in the Electric Power Research Institute (EPRI) Topical Report (TR)-112657, Revision B-A (Reference 3, or the TR), which was previously reviewed and approved by the NRC. The NRC staff's SE dated October 28, 1999, approving the methodology described in the topical, concluded that this methodology conforms to the guidance provided in RGs 1.174 and 1.178, and that no significant risk increase should be expected from the changes to the ISI program resulting from applying the methodology. The transmittal letter for this SE, of the same date, stated that an RI-ISI program as described in the topical utilizes a sound technical approach and will provide an acceptable level of quality and safety. It also stated that, pursuant to 10 CFR 50.55a, any RI-ISI program meeting the requirements of the topical provides an acceptable alternative to the piping ISI requirements with regard to (1) the number of locations, (2) the locations of inspections, and (3) the methods of inspection.

Hence, the NRC staff concludes that the regulatory approach taken by PPL is acceptable.

3.0 TECHNICAL EVALUATION

The NRC staff has reviewed PPL's regulatory and technical analysis in support of its requests for relief for the Third 10-Year ISI Interval Program Plan for SSES 1 and 2. The detailed evaluation below supports the conclusion that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by the operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the relief will not be inimical to the common defense and security or to the health and safety of the public.

Pursuant to 10 CFR 50.55a(a)(3)(i), the NRC staff has reviewed and evaluated PPL's proposed RI-ISI program based on guidance and acceptance criteria provided in the following documents:

- RGs 1.174 and 1.178 (References 5 and 6)
- NRC NUREG-0800, Chapter 3.9.8 (Reference 7)
- EPRI TR-112657 (Reference 3)
- NRC SE for EPRI TR-112657 (Reference 4)

3.1 Proposed Changes to the ISI Program

The scope of PPL's proposed changes to its ISI program is limited to ASME Code Class 1 and 2 piping welds for the following Examination Categories: (1) B-F for pressure retaining dissimilar metal welds in vessel nozzles, (2) B-J for pressure retaining welds in piping, (3) C-F-1 for pressure retaining welds in austenitic stainless steel or high alloy piping, and (4) C-F-2 for pressure retaining welds in carbon or low alloy steel piping. The RI-ISI program is proposed as an alternative to the existing ISI requirements of the ASME Code, Section XI.

The end result of the program changes is that the number and locations of non-destructive examination (NDE) inspections based on ASME Code, Section XI requirements will be replaced by the number and locations of these inspections based on the RI-ISI guidelines. The ASME Code requires, in part, that for each successive 10-Year ISI interval, 100% of Category B-F welds and 25% of Category B-J welds for the ASME Code Class 1 non-exempt piping be selected for volumetric and/or surface examination based on existing stress analyses and cumulative usage factors. For Category C-F welds in Class 2 piping, 7.5% of non-exempt welds are selected for volumetric and/or surface examination. The proposed RI-ISI program for Unit 1 selects 51 of 394 (12.9%) in-scope ASME Class 1 piping welds for NDE, and 29 of 899

(3.2%) in-scope ASME Class 2 piping welds. For Unit 2, it selects 53 of 379 (14.0%) in-scope ASME Class 1 piping welds for NDE, and 27 of 882 (3.1%) in-scope ASME Class 2 piping welds for NDE. The surface examinations required by the ASME Code, Section XI, will be discontinued while system pressure tests and VT-2 visual examinations shall continue. These results are consistent with the concept that, by focusing inspections on the most safety significant welds, the number of inspections can be reduced while at the same time maintaining protection of public health and safety.

PPL states in the submittal that no augmented piping inspection programs are integrated into the RI-ISI program with exception of the intergranular stress-corrosion cracking (IGSCC) Category A welds. PPL then explicitly lists those augmented inspection programs that are not integrated into the RI-ISI program:

- IGSCC in boiling-water reactor (BWR) Austenitic Stainless Steel Piping (Generic Letter 88-01 and NUREG-0313). However, PPL notes that IGSCC Category A welds were subsumed into the RI-ISI program.
- Flow Accelerated Corrosion (FAC) Generic Letter (GL) 89-08.
- High Energy Line Breaks (USNRC Branch Technical Position MEB 3-1).

The subsuming of Category A welds in GL 88-01 by the RI-ISI program is permitted in accordance with the TR, since Category A welds are considered resistant to IGSCC. PPL states in Reference 15 (both in Attachment 2 and in the submittal (Attachment 4)) that elements in the scope of the above augmented inspection programs were included in the consequence analysis, failure potential assessment, and risk characterization evaluations to determine whether the affected piping was subject to damage mechanisms other than those addressed by these augmented programs. If another damage mechanism was identified, the element was retained within the scope of consideration for element selection as part of the RI-ISI program. When inspections are required under the RI-ISI and augmented programs, all inspection requirements for both RI-ISI and augmented programs are met. If no other damage mechanism was identified, the element was excluded from the RI-ISI element selection population (i.e., not included in the population of elements from which 25% or 10% must be selected for inspection) and retained in the appropriate augmented inspection program. PPL's approach deviates from the approved methodology because the methodology in the TR includes all elements in the RI-ISI element selection population but allows crediting up to 50% of the augmented inspections as RI-ISI element inspections. This deviation is acceptable because inspections required only in the augmented programs are not credited as RI-ISI inspections, elements in the augmented programs will continue to be inspected for the appropriate degradation mechanisms, and the RI-ISI program will address other damage mechanisms.

Section 2.2[1] of Reference 1 provides a listing of the above, plus additional augmented examination requirements (some of which are piping inspection programs) that "will be performed in addition to the requirements of the ASME Code on a routine basis during the Third

---

[1] Section 2.2 and its subsections of Reference 1 is part of the overall Third Inspection Interval package from the licensee, but is not contained within the original or the revised submittal.

ISI Interval." The additional augmented piping inspection programs are listed in the table below:

Source Document	Subject	Status of Incorporation into Licensee RI-ISI Program
Final Safety Analysis Report (FSAR) 6.6.8	Augmented Inservice Inspection To Protect Against Postulated Piping Failures	Section 2.2.1 of Reference 1 notes that augmented inspection program AUG 1 "defines the mandatory examination requirements of SSES FSAR [Final Safety Analysis Report] Section 6.6.8 as it applies to SSES, Units 1 and 2 "no break zone" piping, (i.e., piping for which no breaks have been postulated)."
(None Given)[2]	Augmented Inservice Inspection For Vibration Induced Failures	Section 2.2.3[2] of Reference 1 notes that augmented inspection program AUG 8 defines the nondestructive examination requirements established by PPL to investigate and identify areas, throughout SSES, Units 1 and 2, where vibration induced cracking/failures could affect plant reliability and/or safety.

For these programs, PPL indicates that their implementation is included in Section 7.0 of the ISI Program Plan and its database. In Section 2.2 of Reference 1, PPL indicates that the above programs are performed "above and beyond" the requirements of ASME Code, Section XI. This implies that ASME Class 1 and 2 welds within these programs are subject to selection for ISI, and, for the third ISI interval, will be retained within the scope of consideration for element selection as part of the RI-ISI program (i.e. - that these welds are not excluded from the RI-ISI program).

3.2 Engineering Analysis

In accordance with the guidance provided in RGs 1.174 and 1.178 (References 5 and 6), PPL provided the results of an engineering analysis of the proposed changes, using a combination of traditional engineering analysis and supporting insights from the PRA. PPL performed an evaluation to determine susceptibility of components (i.e., a piping weld) to a particular degradation mechanism that may be a precursor to leak or rupture, and then performed an independent assessment of the consequence of a failure at that location. The results of this analysis assure that the proposed changes are consistent with the principles of defense-in-depth because EPRI TR-112657 methodology requires that the population of welds with high

---

[2] Section 2.2.3 of Reference 1 states that AUG 8 program examination requirements are based on industry group recommendations, boiling-water reactor (BWR) plant experience, and PPL site experience.

consequences following failure will always have some weld locations inspected regardless of the failure potential. No changes to the evaluation of design-basis accidents in the final safety analysis report are being made by the RI-ISI process. Therefore, sufficient safety margins will be maintained.

3.2.1 Failure Potential

Piping systems within the scope of the RI-ISI program were divided into piping segments. Pipe segments are defined as lengths of pipe whose failure (anywhere within the pipe segment) would lead to the same consequence and which are exposed to the same degradation mechanisms. That is, some lengths of pipe whose failure would lead to the same consequence may be split into two or more segments when two or more regions are exposed to different degradation mechanisms. PPL's submittal states that failure potential assessment, summarized in Table 2 of the submittal, was accomplished utilizing industry failure history, plant-specific failure history, and other relevant information using the guidance provided in the TR.

PPL does not note any deviations in their application of this guidance, but indicates that weld failure rates and rupture frequencies were also calculated, using information in EPRI TR-111880 (Reference 8). Results from these calculations contributed to the processes of risk characterization, selection of weld locations, and change in risk assessment. These calculations are described in PPL's tier 2 documentation.

The NRC staff concludes that PPL has met the Standard Review Plan (SRP) 3.9.8 guidelines to confirm that a systematic process was used to identify the components' (i.e., pipe segments) susceptibility to common degradation mechanisms, and to categorize these degradation mechanisms into the appropriate degradation categories with respect to their potential to result in a postulated leak or rupture.

3.2.2 Consequence Analysis

PPL states that the consequences of pressure boundary failures were evaluated and ranked based on their impact on conditional core damage probabilities (CCDP) and conditional large early release probabilities (CLERP), and that the impact due to both direct and indirect effects was considered using the guidance provided in the TR. Rather than using the provided qualitative consequence categorization tables, PPL chose to calculate CCDP and CLERP directly from their PRA, and then compare the results to the ranges provided in Table 3-1 of the TR. PPL reports no deviations from the approved consequence evaluation methodology. Therefore, the NRC staff considers the consequence evaluation performed by PPL for this application to be acceptable.

3.2.3 Probabilistic Risk Assessment

In Reference 15 (both in Attachment 1 and in the submittal (Attachment 4)), PPL indicates that the SSES 1 and 2 PRA model used for this application has undergone a significant revision in connection with an industry peer review, and thus is not based on, nor is it an extension of the individual plant examination (IPE) model. PPL indicates in Attachment 1 to Reference 15 that this version of the risk model, identified as EC-RISK-1127, is a full Level 1 PRA model, and that it is currently developing a full Level 2 PRA model.   However, PPL also indicates that this model is provided with the tools needed to identify large early release (LERF) sequences, from which LERF can be estimated. In Attachment 2 of Reference 15, PPL states that the baseline core damage frequency (CDF) estimated from this PRA model is 2.96E-6/yr and 2.78E-6/yr for Units 1 and 2 respectively, and the baseline LERF estimated is 1.18E-6/yr for both units.

3.2.3.1 NRC Staff/Industry Review of the PRA

The original Susquehanna Steam Electric Station individual plant examination (IPE) was submitted to the NRC in December 1991. The IPECDF was approximately 5E-7/year. The NRC staff SE of the IPE, dated August 11, 1998, concluded that the IPE's process is adequate to meet the objectives of the IPE program as stated in GL 88-20, "Individual Plant Examination for Severe Accident Vulnerabilities." The Level 1 IPE (as revised) was found to be an "exemplary" PRA. However, PPL was advised to "continually confirm the IPE's reliability of equipment and operator performance ensuring that it portrays SSES 1 and 2 plant capability under severe accident conditions." The Level 2 IPE was found to contain some weaknesses. They are briefly described as follows:

- Sequences in which the containment fails prior to core damage were treated as core damage sequences. But they were not analyzed to better understand plant behavior. This was addressed in Attachment 1 to Reference 15 as "Identified Weakness #1."

- There needs to be a more detailed treatment of the coolability of debris beds on the containment floor. In the IPE it was assumed that such beds would always be quenched. This may have led to an understatement of the conditional containment failure probability. This was addressed in Attachment 1 to Reference 15 as "Identified Weakness #2."

- Interfacing-systems loss-of-coolant accident (ISLOCA) sequences were not fully developed. PPL had not completed its reanalysis prior to submitting the revised IPE. This was addressed in Attachment 1 to Reference 15 as "Identified Weakness #3."

Since the issuance of the SER on the IPE, PPL has addressed these weaknesses as follows:

For "Identified Weakness #1" PPL states that it has made several improvements of the model to better reflect plant behavior.   Specifically the model determines if, following containment failure prior to core damage, adequate injection sources from outside containment are successful. If so, then the sequence is "no core damage." If not, then the sequence may be a contributor to LERF, depending on timing.

For "Identified Weakness #2" PPL states that based on a more detailed study of containment failure mechanisms, the drywell liner is not susceptible to failure in the event of reactor pressure vessel melt-through and the accumulation of core-debris to the point of non-coolability. Other containment failure mechanisms were evaluated and incorporated into the current PRA model as applicable.

For "Identified Weakness #3" PPL states that ISLOCA has been fully addressed in the current PRA model.

From PPL's responses to IPE weaknesses, the NRC staff concludes that none of these weaknesses, as addressed by PPL, would have a significant impact on the RI-ISI application.

PPL states in Attachment 1 to Reference 15 that the PRA model used to support the original submittal (Reference 1) was a prior version to the current (peer-reviewed) version. PPL states in the submittal that a Boiling Water Reactors Owners Group (BWROG) probabilistic safety assessment peer review was performed in October 2003. In addition, PPL also states in Attachment 1 to Reference 15 that a post-peer review model, revised to incorporate the more significant Facts and Observations (F&Os), was used to re-perform the entire application, including the consequence analysis, risk characterization, and risk impact assessment. Also in Attachment 1 to Reference 15, PPL provides a complete listing of the Level B F&Os, along with their disposition. (PPL states that there were no Level A F&Os from this peer review.) PPL provides this listing in two groups; those which have been addressed and incorporated as needed into the current (EC-RISK-1127) model (38 F&Os), and those which it anticipates resolving and incorporating into the model to be released after the first periodic update of this model (21 F&Os). PPL indicates that the F&Os in the former group were determined to have the most significant effect upon PRA results. The NRC staff reviewed PPL's descriptions and resolutions of these F&Os and found them to be reasonable. For the latter group of F&Os, PPL provides a discussion of the sensitivity of the RI-ISI application for each F&O in Attachment 1 to Reference 15. PPL concludes that the resolution of these F&Os will have an insignificant impact on the application. The NRC staff reviewed these F&Os, along with the discussions of this application's sensitivity to them, and finds PPL's conclusion to be reasonable.

The NRC staff concludes that PPL has adequately demonstrated that significant comments from the NRC staff's review of PPL's IPE, and many of the significant comments from the October 2003 BWROG peer review of PPL's then-current PRA have been adequately addressed and incorporated into the PRA model used for this application. The NRC staff further concludes that the remaining significant comments from the October 2003 BWROG peer review of PPL's then-current PRA which have not yet been incorporated into the PRA model used for this application, will not measurably affect this RI-ISI application. The NRC staff did not review the current PRA models to assess the accuracy of the quantitative estimates. The NRC staff recognizes that the quantitative results of the PRA model are used as order of magnitude estimates to support the assignment of segments into three broad consequence categories. Inaccuracies in the models or in assumptions large enough to invalidate the broad categorizations developed to support the RI-ISI should have been identified during the NRC staff's review of the IPE, and by PPL's model update control program that included peer review/certification of the PRA model. Minor errors or inappropriate assumptions will affect only the consequence categorization of a few segments and will not invalidate the general results or conclusions.

3.2.3.2 Change in Risk

As required by Section 3.7 of the TR, PPL evaluated the change in risk expected from replacing the current ISI program with the RI-ISI program. The analysis estimates the net change in risk due to the positive and negative influence of adding and removing locations from the inspection program. As discussed in Section 3.1 of this SE, PPL deviated from the EPRI methodology by excluding some elements from the population of elements from which RI-ISI locations for inspection were selected. In Attachment 2 of Reference 15, PPL states that the risk impact assessment included the increase in risk caused by the discontinued ASME Code, Section XI inspections in the population of elements excluded from RI-ISI element selection. Therefore, excluding some elements from the population of elements for possible inspection does not affect the change in risk calculations.

PPL states in the submittal that it used the failure frequencies developed in EPRI TR-111880 (Reference 8) to support the estimate for the change in risk. The non-proprietary version of TR-111880 (Reference 9) illustrates the characteristics and format of the information used, but does not include the calculated parameters. The change in risk was calculated utilizing the Markov model described in EPRI TR-111061 (Reference 10). This method utilizes a parameter known as the inspection efficiency factor (IEF) to estimate the reduction in pipe failure frequency arising from including the element in an ISI program. This factor incorporates the time between ISI inspections and the time between opportunities to detect a leak together with the probability of detection, and is calculated from the ratio of hazard rates which are intermediate solutions in the Markov methodology. In Attachment 1 to Reference 15, PPL states that "Section 7 of the Susquehanna Tier 2 RI-ISI document entitled, "Risk Informed Inservice Inspection Evaluation Final Report July 2003, Susquehanna Steam Electric Station, Unit 1 and 2," documents the methodology and input for calculating the IEF." This methodology is consistent with that used in the RI-ISI analysis for Exelon's nine RI-ISI submittals, including Dresden Station as one example." Because the specific method for calculating the IEF is the same as that previously approved by the NRC staff (i.e. - for the Dresden RI-ISI submittal, as documented in Reference 12), the NRC staff finds PPL's calculation of IEF acceptable to use in support of this RI-ISI submittal.

PPL's estimated changes in CDF and LERF for SSES 1 and 2 are shown in the table below:

Unit	Change in CDF (relative to Section XI ISI program)		Change in LERF (relative to Section XI ISI program)	
	RI-ISI	No Inspections	RI-ISI	No Inspections
Unit 1	3.39E-8/Rx-yr	8.78 E-8/Rx-yr	1.29 E-8/Rx-yr	3.19 E-8/Rx-yr
Unit 2	2.60E-8/Rx-yr	8.66 E-8/Rx-yr	1.09 E-8/Rx-yr	3.82 E-8/Rx-yr

PPL also reported the system level changes for all the systems included in the scope of the submittal. All of the estimated changes in risk are below the TR's guideline for acceptable estimated changes in CDF and LERF.

The NRC staff finds PPL's process to evaluate and bound the potential change in risk reasonable because it (1) accounts for the change in the number and location of elements inspected, (2) recognizes the differences in degradation mechanisms related to failure likelihood, and (3) considers the synergistic effects of multiple degradation mechanisms within the same piping segment. System level and aggregate estimates of the changes in CDF and LERF are less than the corresponding guideline values in the TR. The NRC staff finds that re-distributing the welds to be inspected with consideration of the safety significance of the segments provides assurance that segments whose failure have a significant impact on plant risk receive an acceptable and often improved level of inspection. Therefore, the NRC staff concludes that the implementation of the RI-ISI program, as described in PPL's submittal, will have a small impact on risk consistent with the guidelines of RG 1.174.

3.2.4 Integrated Decisionmaking

PPL used an integrated approach in defining the proposed RI-ISI program by considering in concert the traditional engineering analysis, the risk evaluation, the implementation of the RI-ISI program, and performance monitoring of piping degradation. This is consistent with the guidelines given in RG 1.178.

3.2.4.1 Risk Characterization

In the submittal, PPL describes a process by which pipe segments (and ultimately the elements within, all of which have the same degradation susceptibility) are ranked. This described process is consistent with that given in the TR.

3.2.4.2 Selection of Element Population for Inspection

As previously discussed in Section 3.1 of this SE, PPL indicates that affected elements were included into the consequence analysis, failure potential assessment, and risk characterization evaluations. If it was determined in the failure potential assessment that a given element is subject to damage mechanisms other than those addressed by either the GL 88-01 (for IGSCC) and the GL 89-08 (for FAC) augmented inspection programs, it was retained within the scope of consideration for selection as part of the RI-ISI program. When inspections are required under both the RI-ISI and augmented programs, all inspection requirements for both RI-ISI and augmented programs are met. However, as stated in Section 3.1 of this SE, if no other damage mechanism was identified, the element was excluded from the RI-ISI element selection population (i.e., not included in the population of elements from which 25 percent or 10 percent must be selected for inspection) and retained in the appropriate augmented inspection program. This treatment was identified by the NRC staff as a deviation from the methodology, but was found acceptable as explained in Section 3.1.

The process of selecting pipe elements from the remaining “in-scope” population to be inspected is described in Section 3.5 of PPL’s submittal. PPL’s description of the process of selecting of high and medium risk-ranked piping elements to be examined is consistent with the guidance provided in the TR. PPL used the results of the risk category ranking and several other considerations in selecting these pipe elements. For example, within a given risk ranking (high or medium), to meet the requisite sampling percentages, PPL states that it considered the following additional factors:

- whether the element has been previously selected for ISI exams,
- whether previous exams had indications of possible damage
- presence of radiation fields in the vicinity of the elements
- accessibility of the element for inspection, and
- numerical estimates of the pipe rupture frequencies at these locations

In addition, PPL states that an attempt was made to ensure that all damage mechanisms and all identified combinations of damage mechanisms were represented in the final selection of element locations, and that the selection of the requisite percentage of locations for each risk category was performed on a system-by-system basis. (This treatment led to the selection of more than the minimum requisite number of locations, and is conservative.) The NRC staff finds these considerations to be consistent with those given in Section 3.6.5.2 of the TR.

PPL provides detailed information on the results of the evaluation in the following tables included in the submittal:

- Table 2 provides the failure potential assessment summary for Units 1 and 2 (identical for both units).
- Tables 3 and 4 identify on a per system basis, the number of segments and number of elements (welds) by risk category for Units 1 and 2, respectively. For completeness of information, it shows the number of locations that were excluded from the scope of the RI-ISI program, by system and risk category.
- Tables 5 and 6 provide a summary table for each unit comparing the number of inspections required under the 1989 ASME Code, Section XI, ISI program with the alternative RI-ISI program.
- Tables 7 and 8 provide the risk impact analysis results for each system for Units 1 and 2, respectively.

Also, in Attachment 3 to Reference 15, Tables 6-1 and 6-2 provide summary information, by risk category, and then further broken down by system, from Tables 3 through 6 above, with the calculated percentage of elements selected for NDE for each risk category in each unit.

Based on the information provided by PPL in its submittal, the requirement in the TR to perform NDE inspections on at least 25% of the locations in the high-risk region and 10% of the locations in the medium-risk region is met. Also, PPL states in Tables 6-3 and 6-4 of Attachment 3 to Reference 15 that the percentage of total Class 1 welds (includes butt and socket welds) selected for examination is 12.9% and 14.0% for SSES 1 and 2, respectively. This meets the EPRI TR-112657 guidelines for avoiding excessive reduction in Class 1 element examinations.

The NRC staff concludes that PPL's element selection process is consistent with the guidelines of the TR. Hence, PPL's selection of element locations, which includes consideration of degradation mechanisms in addition to those covered by augmented inspection programs, is judged to be acceptable.

With respect to the NRC staff-identified deviation in Section 3.1 of this SE, the NRC staff notes that a large number of the elements excluded from the RI-ISI element selection population are Risk Category 1 elements which are associated with the FAC (GL 89-08) Augmented Inspection Program (and have no other known degradation mechanism). FAC examinations inspect for material wall thickness only and do not provide a robust weld examination that would normally be required for welds being examined under the RI-ISI program. While the NRC staff concurs that PPL's exclusion of these welds from the sample population, based on its FAC inspections, is acceptable, this concurrence is given on the presumption that plant operating conditions will not change significantly. The NRC staff notes that of the above welds which were excluded from the RI-ISI population, 256 Unit 1 welds and 276 Unit 2 welds are located in the Main Steam (MS) system. An extended power uprate at a BWR plant causes a significant increase in flow and vibration in the MS system. Since PPL's RI-ISI program is based in part on operating experience, the NRC staff expects that PPL will conduct a complete evaluation of these elements, and take into account changing operating conditions. The NRC staff also notes that it expects PPL to evaluate the effects of changing operating conditions upon the remainder of the RI-ISI program as well. Therefore, the NRC staff would expect to see, as part of any future power uprate application, an evaluation of all elements associated with the FAC (GL 89-08) Augmented Inspection Program which have no other known degradation mechanism.

3.2.4.3 Examination Methods

As noted in Section 2 of this SE, the objective of the ISI is to identify conditions (i.e., flaw indications) that are precursors to leaks and ruptures in the pressure boundary that may impact plant safety. To meet this objective, the risk-informed location selection process, per the TR, employs an “inspection for cause” approach. To address this approach, Section 4 of the TR provides guidelines for the areas and/or volumes to be inspected, as well as the examination method, acceptance standard, and evaluation standard for each degradation mechanism.

Based on its review and acceptance of the TR, the NRC staff concludes that these examination methods are appropriate since they are selected based on specific degradation mechanisms, pipe sizes, and materials of concern. PPL states that Section 4 of the TR and ASME Code Case N–578-1 (Reference 11) was used as guidance in determining the examination methods and requirements for these locations. In References 1 and 2, PPL elaborates on the use of ASME Code Case N–578-1 in its overall discussion of Relief Request 3RR-01. In the section of this Relief Request entitled “Proposed Alternate Revisions” PPL states:

> To supplement the requirements listed in Table 4-1, "Summary of Degradation-Specific Inspection Requirements and Examination Methods" of EPRI TR-112657, SSES will utilize the provisions listed in Table 1, Examination Category R-A, "Risk-Informed Piping Examinations" contained in Code Case N–578-1. To implement Note 10 of this table, paragraphs and figures from the 1998 Edition through the 2000 Addenda of ASME Section XI (SSES's Code of record for the Third Interval) will be utilized which parallel those referenced in the Code Case for the 1989 Edition. Table 1 of Code Case N–578-1 will be used as it provides risk informed Category/Item Numbers, a detailed breakdown for examination method, and a categorization of parts to be examined where the TR is either silent or ambiguous.

A key difference between Table 4-1, "Summary of Degradation-Specific Inspection Requirements and Examination Methods," of the TR, and Table 1 of ASME Code Case N–578-1, is that PPL proposes to inspect socket welds by the VT-2 examination method based on the guidance from Table 1 of ASME Code Case N–578-1, as there is no specific guidance provided in the TR. In Note 12 to Table 1 of this ASME Code Case, it is stated that socket welds require only VT-2 examinations during each refueling outage. The VT-2 examination technique is effective in identifying leakage when the cracks become through-wall in the welds. The NRC staff notes that due to the weld geometry limitations, ultrasonic examinations of the socket welds are not practical as no meaningful results can be obtained from such examinations.

The NRC staff also notes that Table IWB-2500-1 of ASME Code, Section XI, requires surface examinations of the socket welds. Surface examinations are an effective method for the detection of cracks initiated from the weld outside surfaces by causes such as the external chloride stress corrosion cracking (ECSCC) or fatigue resulting from high-bending stresses or vibration. In Reference 2, PPL states that SSES 1 and 2 does not have any components under Item No. R1.19 of Table 1 of Reference 11, “Elements Subject to ECSCC,” and therefore, will not be taking any exceptions to Note 12 of this table. Based on the consideration discussed above, the NRC staff has determined that the VT-2 examination of socket welds, in lieu of volumetric or surface examinations, is acceptable for SSES 1 and 2 because there is reasonable assurance that the proposed examinations will not lead to degraded piping performance when compared to the existing performance levels.

PPL also proposes to use the guidance from Table 1 of Reference 11 for examination of elements not subject to a damage mechanism (Item Number R1.20). This is due to the fact that the TR does not provide any specific guidance for the examination of the referenced elements beyond the number of elements to be examined. In Table 1 of Reference 11, the elements in Item Number R1.20 are required to be examined by a volumetric method. In addition, for the examination of elements with full penetration welds, an expanded examination volume is specified in Note 1 of Table 1. Note 1 requires that the length for the examination volume shall be increased to include ½ inch beyond each side of the base metal thickness transition or counterbore. Based on the above, the NRC staff has determined that PPL's proposed examination method and volume for elements not subject to a damage mechanism (Item No. R1.20) is acceptable. This is based on the consideration that the proposed volumetric examination method is consistent with the guidance provided in the TR, and that the proposed examination volume is similar to, or more conservative than, that required by the ASME Code. ASME Code Case N-578-1 has not been approved by NRC for generic use. Only the specific portions of this ASME Code Case cited in this SE or in the TR are accepted for use in the RI-ISI program at SSES 1 and 2. It is necessary to point out that this SE does not endorse the use of ASME Code Case N-578-1.

Based on these considerations, the NRC staff concludes that PPL's determination of examination methods is acceptable.

3.2.4.4 Relief Requests for Examination Locations and Methods

As required by Section 6.4 of the TR, PPL has completed an evaluation of existing relief requests to determine if any should be withdrawn or modified due to changes that occur from implementing the RI-ISI program. It concludes in the TR that there are no existing relief requests required to be withdrawn. It also concludes that none of the existing relief requests needs to be modified due to RI-ISI expansion of the examination volume.

PPL states that for any examination location where greater than 90 percent volumetric coverage cannot be obtained, the process outlined in the TR will be followed. The NRC staff finds PPL's proposed treatment of existing relief requests acceptable.

3.2.4.5 Implementation and Monitoring

Implementation and performance monitoring strategies require careful consideration by PPL and are addressed in Element 3 of RG 1.178 and SRP 3.9.8. The objective of Element 3 is to assess performance of the affected piping systems under the proposed RI-ISI program by utilizing monitoring strategies that confirm the assumptions and analyses used in the development of the RI-ISI program. Pursuant to 10 CFR 50.55a(a)(3)(i), a proposed alternative, in this case the implementation of the RI-ISI program, including inspection scope, examination methods, and methods of evaluation of examination results, must provide an acceptable level of quality and safety.

PPL states that upon approval of the RI-ISI program, procedures that comply with EPRI TR-112657 guidelines will be prepared to implement and monitor the RI-ISI program. PPL states in the submittal that the applicable aspects of the ASME Code not affected by the proposed RI-ISI program would be retained.

PPL indicates in Section 4 of the submittal that the RI-ISI program is a living program and its implementation will require feedback of new relevant information to ensure the appropriate identification of safety significant piping locations. PPL also states in Reference 15 (cover letter and Attachment 2) that, as a minimum, it will require that a review of the RI-ISI Program (including the risk-ranking of piping elements) be undertaken at least once per inspection period. In the submittal PPL states that significant changes may occur more frequently as directed by NRC Bulletin or GL requirements, or by industry and plant-specific service experience feedback. These periodic reviews and adjustments of the risk-ranking of segments ensure that future changes to the PRA that PPL will make to incorporate the currently unresolved peer review results will also be incorporated into the RI-ISI program as necessary.

PPL addresses additional examinations in Section 3.5 of the submittal, stating that examinations performed that reveal flaws or relevant conditions exceeding the applicable acceptance standards shall be extended to include additional examinations. These additional examinations shall include piping structural elements with the same postulated failure mode and the same or higher failure potential. Additional examinations will be performed on these elements up to a number equivalent to the number of elements with the same postulated failure mode originally scheduled for that fuel cycle. If the additional required examinations reveal flaws or relevant conditions exceeding the referenced acceptance standards, the examinations shall be further extended to include all elements whose postulated failure modes are the same as the piping structural elements originally examined, throughout the scope of the program. PPL also proposes, as part of Relief Request 3RR-01, to follow the requirements of Subarticle-2430 of ASME Code Case N–578-1, in lieu of Section 3.6.6.2 of the TR, with regard to additional examinations, noting that the ASME Code Case provisions are more refined. While the criteria for performing sample expansions in the ASME Code Case are mostly similar to those of ASME Code, Section XI, IWB-2430, the NRC staff has not endorsed this ASME Code Case. However, the NRC staff finds the use of this particular alternative to the counterpart provision in the TR to be acceptable, in that the scope of additional examinations in the ASME Code Case is no less than what is expected in the TR.

The submittal, Reference 2 and Reference 13, contain discussions about the timeframe for completing these additional examinations. In Reference 14, PPL provides a final commitment by stating that PPL will perform any examinations of either a first, and if necessary, a second sample expansion during the same outage timeframe as when the original flaws or relevant conditions are found. The NRC staff finds PPL's approach acceptable since all required additional examinations will be performed during the outage that the indications or relevant conditions are identified.

The NRC staff finds that the proposed process for the RI-ISI program implementation, monitoring, feedback, and update meets the guidelines of RG 1.174 which states that risk-informed applications should include performance monitoring and feedback provisions. Hence, PPL's proposed process for program implementation, monitoring, feedback, and update is judged to be acceptable.

4.0 CONCLUSIONS

Pursuant to 10 CFR 50.55a(a)(3)(i), alternatives to the requirements of 10 CFR 50.55a(g) may be used, when authorized by the NRC, if the licensee demonstrates that the proposed alternatives will provide an acceptable level of quality and safety. In this case, PPL has proposed an alternative to use the risk-informed process described in NRC-approved EPRI TR-112657.

RG 1.174 establishes requirements for risk-informed decisions involving a change to a plant's licensing basis. RG 1.178 establishes requirements for risk-informed decisions involving alternatives to the requirements of 10 CFR 50.55a(g) (ISI program requirements), and its directive to follow the requirements of ASME Code, Section XI. These two RGs, taken together, define the elements of an integrated decision-making process that assesses the level of quality and safety embodied in a proposed change to the ISI program. EPRI TR-112567 RI-ISI methodology contains the necessary details for implementing this process. This methodology provides for a systematic identification of safety-significant pipe segments, for a determination of where inspections should occur within these segments (i.e. - identification of locations), and for a determination of how these locations will be inspected. Such segments/locations are characterized as having active degradation mechanisms, and/or whose failure would be expected to result in a significant challenge to safety (either immediately by initiating an event or later on in response to an unrelated event).

EPRI TR-112657 methodology also provides for implementation and performance monitoring strategies, to insure a proper transition from the current ISI program, and to assure that changes in plant performance, and new information from the industry and/or from the NRC, is incorporated into PPL's ISI Program as needed.

Other aspects of PPL's ISI Program, such as system pressure tests and visual examination of piping structural elements will continue to be performed on all Class 1, 2, and 3 systems in accordance with ASME Code, Section XI. This provides a measure of continued monitoring of areas that are being eliminated from the NDE portion of the ISI program. As required by EPRI TR-112657 methodology, the existing ASME Code performance measurement strategies will remain in place. In addition, EPRI TR-112657 methodology provides for increased inspection volumes for those locations that are included in the NDE portion of the program.

The NRC staff concludes that PPL's development of its RI-ISI program is consistent with the methodology described in the TR. The NRC staff identified one deviation from this methodology, in that elements in the scope of the GL 88-01 (for IGSCC), the GL 89-08 (for FAC), and the High Energy Line Break (USNRC Branch Technical Position MEB 3-1) augmented inspection programs, for which no other damage mechanisms were identified, were excluded from the RI-ISI element selection population (i.e., not included in the population of elements from which 25 percent or 10 percent must be selected for inspection) and retained only in their respective augmented inspection programs. This deviation has been identified in previous submittals and found to be acceptable. This deviation is acceptable because PPL did not credit the augmented inspection programs as RI-ISI inspections, and that these elements in the augmented programs will continue to be inspected for the appropriate degradation mechanisms while the RI-ISI program will address other damage mechanisms associated with elements that remain within the scope of the RI-ISI program.

Hence, the NRC staff concludes that PPL's proposed program which is consistent with the methodology as described in the TR, will provide an acceptable level of quality and safety pursuant to 10 CFR 50.55a(a)(3)(i) for the proposed alternative to the piping ISI requirements with regard to (1) the number of locations, (2) the locations of inspections, and (3) the methods of inspection.

The NRC staff concludes that PPL's proposed RI-ISI program is an acceptable alternative to the current ISI program for ASME Code, Class 1 and Class 2 piping welds at SSES 1 and 2. Therefore, the proposed RI-ISI program as submitted under Relief Request 3RR-01 is authorized for the third 10-Year ISI interval pursuant to 10 CFR 50.55a(a)(3)(i) on the basis that this alternative will provide an acceptable level of quality and safety.

5.0 REFERENCES

1. Letter from B. L. Shriver, PPL Susquehanna, LLC, to U.S. Nuclear Regulatory Commission,"Susquehanna Steam Electric Station Proposed Third Ten-Year Inservice Inspection Interval Inservice Inspection Program Plan For Susquehanna SES Units 1 and 2," Docket Nos. 50-387 and 50-388, PLA-5662, dated September 16, 2003.

2. Letter from B. L. Shriver, PPL Susquehanna, LLC, to U.S. Nuclear Regulatory Commission, "Susquehanna Steam Electric Station Response to Request for Additional Information from NRC on Proposed Relief Request Nos. 3RR-01, 3RR-02, and 3RR-04 to the Third 10-Year Inservice Inspection Program for Susquehanna Units 1 and 2, PLA-5767," dated June 18, 2004.

3. PERI TR-112657, Revision B-A, "Revised Risk-Informed Inservice Inspection Evaluation Procedure," Final Report, December 1999.

4. NRC Staff's Safety Evaluation on PERI TR-112657, Revision B-A, dated October 28, 1999.

5. NRC Regulatory Guide 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," Revision 1, November 2002.

6. NRC Regulatory Guide 1.178, "An Approach for Plant-Specific Risk-Informed Decision making for Inservice Inspection of Piping," Revision 1, September 2003.

7. NRC NUREG-0800, Chapter 3.9.8, "Standard Review Plan For the Review of Risk-Informed Inservice Inspection of Piping," Revision 1, September 2003.

8. PERI TR-111880, "Piping System Failure Rates and Rupture Frequencies for Use in Risk-Informed Inservice Inspection Applications," Final Report, September 1999 (proprietary).

9. PERI TR-111880-NP, "Piping System Failure Rates and Rupture Frequencies for Use in Risk-Informed Inservice Inspection Applications," Final Report, November 2000 (nonproprietary).

10. PERI TR-110161, “Piping System Reliability and Failure Rate Estimation Models for Use in Risk-Informed InService Inspection Applications,” December 1998 (proprietary).

11. ASME Code Case N–578-1, “Risk-Informed Requirements for Class 1, 2, and 3 Piping, Method B, Section XI, Division 1," March 28, 2000.

12. Letter from Preston Swafford, Dresden Nuclear Power Station, Commonwealth Edison Company, to U.S. Nuclear Regulatory Commission, “Alternative to the ASME Boiler and Pressure Vessel Code Section XI Requirements for Class 1 and 2 Piping Welds Risk-Informed Inservice Inspection Program,” October 18, 2000.

13. Letter from B. T. McKinney, PPL Susquehanna, LLC, to U.S. Nuclear Regulatory Commission, “Susquehanna Steam Electric Station Clarification to Responses Provided for Relief Requests 3RR-01, 3RR-02, and 3RR-04 for Third Ten-Year Interval Inservice Inspection Program Susquehanna Units 1 and 2 on June 18, 2004, PLA-5804,” dated September 16, 2004.

14. Letter from B. T. McKinney, PPL Susquehanna, LLC, to U.S. Nuclear Regulatory Commission, “Susquehanna Steam Electric Station Additional Clarification on Proposed Relief Request Nos. 3RR-01, 3RR-02 AND 3RR-04 To the Third 10-Year Inservice Inspection Program for Susquehanna Units 1 and 2, PLA 5826,” dated November 3, 2004.

15. Letter from B. T. McKinney, PPL Susquehanna, LLC, to U.S. Nuclear Regulatory Commission, “Susquehanna Steam Electric Station Response to Request for Additional Information from NRC on Proposed Relief Request Nos. 3RR-01 to the Third 10-Year Inservice Inspection Program for Susquehanna Units 1 and 2, PLA-5768,” dated May 6, 2005.

Principal Contributors: M. Melnicoff
R. Davis

Date: July 28, 2005