ADDENDUM of MEMORANDUM OF UNDERSTANDING
between
U.S. NUCLEAR REGULATORY COMMISSION
and
ELECTRIC POWER RESEARCH INSTITUTE
on
COOPERATIVE NUCLEAR SAFETY RESEARCH

Memorandum of Understanding for Nondestructive Examination

Background

On March 14, 2007, the U.S. Nuclear Regulatory Commission (NRC) and the Electric Power Research Institute (EPRI) signed a Memorandum of Understanding (MOU) to allow and encourage cooperation in nuclear safety research that provides benefits for both NRC and industry. These benefits include technical information exchange and cost sharing, whenever such cooperation and cost sharing can be accomplished in a mutually beneficial manner. The MOU is authorized pursuant to Section 31 of the Atomic Energy Act and/or Section 205 of the Energy Reorganization Act. The roles, responsibilities, terms, and conditions of this MOU should not be interpreted in a manner inconsistent with, and shall not supersede, applicable laws and regulations.

Purpose

As reactor facilities continue to age, it becomes more important that adequate inspections are conducted to ensure that components are capable of performing their function and thus, that safety is sufficiently maintained. In-service inspection is one of the primary tools in the management of age-related degradation in nuclear power plants and has become increasingly critical as the units continue to age. The purpose of in-service inspections is to verify that no known or unknown damage mechanisms are compromising reactor safety, operational safety, and personnel safety. Operating plant materials and components have experienced varying levels of degradation, and new mechanisms have become apparent approximately every seven years over the past few decades. Degradation problems may result in significant operational and potential safety problems requiring substantial resources. Dependable in-service inspection programs are one tool that can be used to deal with materials degradation in the management of resources.

Research is warranted for many aspects of in-service inspection. Several examples include:

- Significant NDE issues remain with regard to the examination of materials with coarse-grained microstructures, complicated geometries, and limited access.
- The industry has begun to use high density polyethylene (HDPE) in certain safety-related piping systems; research is warranted in the reliability of detecting lack of fusion in HDPE joints.
- Probability of detection (POD) is of interest in inspections that are credited quantitatively in analyses of present or future fitness for service. The industry has developed guidelines to manage PWSCC through a combination of inspection and mitigation. To rely on inspections as a management technique, the inspections would have to be

capable of detecting PWSCC before the probability of failure would no longer be considered extremely low. Effective and reliable NDE is critical in this regard.

- The reliability of detection and sizing reactor pressure vessel fabrication defects is of interest in analyses of resistance to pressurized thermal shock.
- New materials and the component configurations in advanced reactors may present additional challenges. Cooperative research will greatly benefit both NRC and EPRI.

Objective

This Addendum addresses all aspects of nondestructive examination (NDE) including methods, procedures, equipment, and personnel. The overall objectives are to identify and evaluate the effectiveness of NDE methods in detecting and characterizing flaws, to evaluate the reliability of NDE methods for selected examinations, and to evaluate aspects of inspector qualifications.

The NRC and EPRI have various programs investigating the reliability and effectiveness of various NDE methods. While the research efforts of the NRC and EPRI may be conducted for different purposes, the underlying data and the results obtained have common value to both the NRC and EPRI. Accordingly, to conserve resources and to avoid unnecessary duplication of effort, the NRC and EPRI agree to cooperate in selected NDE-related research efforts and to share information and/or costs related to such research. The information will be shared on a basis that is consistent with the procedures outlined in the NRC/EPRI MOU and this addendum, and under conditions acceptable to existing agreements made with the owners or sponsors of data not owned by NRC or EPRI. The NRC will maintain its independence consistent with its regulatory function. The NRC or EPRI will be individually responsible (with the proper coordination) for certain activities, and none of the activities will be co-funded.

Specific areas of collaboration are identified in Attachments 1 through 5 to this Addendum. However, it is likely that emerging degradation issues at existing plants or issues regarding new plant designs related to the areas of NDE and ISI will be of interest to both organizations and therefore are candidates for future inclusion under this Addendum. Accordingly, additional SOWs may be added to this Addendum without having to revise the Addendum provided: i) the provisions of the Addendum are not modified; ii) new SOWs are subjected to the same organizational approval process as the original Addendum; and iii) new SOWs are signed by the designated officials.

Period of Performance:

March 1, 2011 to March 31, 2014.

Project Direction and Coordination:

Technical meetings to coordinate this effort and to assess progress will be arranged through the respective project managers for each organization. The project managers are:

EPRI	NRC
Greg Selby, Director	Wallace E. Norris, Senior Materials Engineer
NDE	Component Integrity Branch
P.O. Box 217097	Division of Engineering
1300 Harris Blvd	M/S C5A24M
Charlotte, NC 28221	Washington, DC 20555-0001

The NRC or EPRI will be individually responsible (with the proper coordination) for certain activities. To ensure that the overall effort is successfully completed, NRC and EPRI should coordinate proposed contract actions prior to either party entering into an agreement with others. To avoid confusion and maintain consistent project direction, the project managers should discuss matters related to project direction prior to the performance of the activities by the contractor.

Scope

The Addendum addresses multiple NDE-related research areas such as ultrasonic testing (UT), radiographic testing (RT), visual testing (VT), and reliability of examination of cast austenitic stainless steel/dissimilar metal welds. Accordingly, a separate scope of work (SOW) has been developed for each area so that the period of performances, tasks, and deliverables may be more easily tracked. The SOWs are Attachments 1 through 5 to this Addendum. The respective project managers will coordinate the technical information exchanges to be held between EPRI and the NRC. Each Attachment includes both a text description and a summary table; the text description is definitive and the table is a summary for convenience.

Deliverables

Deliverables will be as specified in the Attachments..

Funding

All NRC and EPRI funding for work to be conducted in 2011, 2012, and 2013 is subject to the availability of appropriated funds. None of the work shall be co-funded. EPRI and NRC are responsible for their respective costs in implementing this Addendum. This Addendum does not create any binding obligation or enforceable right of action of any kind on the part of either party. This Addendum does not obligate any funds.

Dispute

If a dispute arises out of or relating to this Agreement, or any breach thereof, the parties will first attempt to settle the dispute through direct negotiation between the respective project managers. If such dispute cannot be settled by the respective project managers, the dispute shall be submitted to the Director of the Office of Nuclear Regulatory Research, USNRC, and the Vice President and Chief Nuclear Officer, EPRI.

Completion of Work Scope

The undersigned representatives of the funding parties or their designees shall review the data and other information resulting from each phase of the work in each Attachment and jointly determine whether the next phase of the Attachment should be executed.

AGREEMENT

__/RA/____________________________
Brian W. Sheron, Director
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission

_____February 25, 2011_______________
Date

__/RA/____________________________
Neil Wilmshurst
Vice President, Nuclear Sector
Electric Power Research Institute

_____March 22, 2011_________________
Date

ATTACHMENT 1

SCOPE OF WORK
Visual Testing

Table 1. Scope of Activities to be Performed and Funding Responsibilities

Task	Responsibility	Deliverables
Task 1 Phase I Round-Robin Testing – Preparation	NRC/EPRI: provide design input for specimens including flaw types; develop round-robin testing protocol	Exchange information during phone calls and meetings
	NRC: fabricate specimens and ship to EPRI	30 specimens with fatigue-like cracks and blanks
	EPRI: host round robin	Provide laboratory space, tank, and needed equipment to conduct round robin
	NRC: identify commercial remote VT vendors (and potentially a camera manufacturer) to participate in round-robin exercise	Arrange for participation in round-robin exercise at NDE Center
	EPRI: identify experienced participant for round-robin exercise	Arrange for participation in round-robin exercise at NDE Center
Task 1 Phase II Round-Robin Testing — Field Practice	NRC/EPRI: provide design input for specimens including flaw types; develop round-robin testing protocol	Exchange information during phone calls and meetings
	EPRI: specimens	Specimens designed, manufactured and fingerprinted according to EPRI QA program
	NRC: specimens	Provide specimens to complement/complete specimen set
	EPRI/NRC: Engage participants; field-experienced personnel, field procedures	Slate of participants (minimum four teams desired)

Task	Responsibility	Deliverables
	EPRI: support conduct of round-robin exercise	Provide laboratory space, immersion tank, etc.; assist proctoring examinations
	NRC: support conduct of round-robin exercise	Provide scanner; assist proctoring examinations
Task 1 Phase III Round-Robin Testing – New Technology	NRC: initial assessment of new camera technology	Develop written assessment to be included in letter report
Task 2 Analyze Results of Exercise	NRC: review inspector results	Written analysis detailing the measured performance in detection and sizing
	EPRI: review inspector results	Written analysis detailing the measured performance in detection and sizing
Task 3 Final Technical Report	NRC: develop report	Develop final technical report discussing in detail scope of visual testing project and results/findings of round-robin exercise
	EPRI: provide input for report	Provide industry assessment of testing for final report; review and comment on draft of report

Background:

U.S. nuclear industry representatives have proposed using visual testing (VT) methods in lieu of certain American Society of Mechanical Engineers Boiler and Pressure Vessel Code Section XI volumetric and/or surface examination requirements. Certain reactor pressure vessel components are examined using VT because the geometry precludes the use of ultrasonic testing (UT). Other components are examined using remote VT to reduce occupational exposure.

Literature searches revealed that few comprehensive studies of the probability of various video systems used for remote VT to detect cracks had been published. To evaluate the reliability and effectiveness of VT, the NRC conducted a parametric study at Pacific Northwest National Laboratory that examined the important variables influencing the effectiveness of remote VT. Six parameters—the important variables that influence the effectiveness of remote VT and the ability of remote systems to detect cracks—were assessed, i.e., crack size, lighting conditions, scanning speed, camera resolution, surface specularity, and surface conditions. A limited laboratory test was also conducted using a commercial visual testing camera system to experimentally determine the ability of the camera system to detect cracks of various widths under ideal conditions. The results of the studies were published in NUREG/CR-6860, "An Assessment of Visual Testing," and NUREG/CR-6943, "A Study of Remote Visual Methods to Detect Cracking in Reactor Components."

As discussed in the reports, the results of the studies indicated that crack opening displacement (COD) is the parameter that most dramatically impacts the reliability of inspections. The studies stated that a significant fraction of the cracks that have been reported in nuclear power plant components are at the lower end of the capabilities of the VT equipment currently being used. The authors suggested that inspection conditions need to be nearly ideal to detect these cracks, and that further study was required to resolve the questions raised through the preliminary research.

Task 1, Phase I:

NRC and EPRI will hold teleconferences/meetings as necessary to develop round-robin visual testing exercise design parameters/testing protocol. The purpose of the teleconferences /meetings is to formulate a plan for the exercise including scope, test variables, and oversight. PNNL is currently fabricating specimens for the exercise. The specimens will be shipped to EPRI prior to the round-robin exercise.

Task 1, Phase II:

NRC/EPRI will jointly be responsible for conducting the round-robin exercise at the EPRI NDE Center to determine the detection and sizing capabilities of current industry visual testing (VT) equipment, procedures, and personnel for a variety of crack sizes and specimen configurations. Both parties will be responsible for identifying commercial remote VT vendors, camera manufacturers, and experienced industry personnel to participate.

Task 1, Phase III:

NRC will conduct a test by a VT camera manufacturer to assess new technology.

Task 2:

Assess the capabilities and limitations of remote visual examinations to detect cracking in NPP components. NRC and EPRI will each separately review the results of the round-robin exercise to attempt to quantify the effectiveness of current practice.

Task 3:

NRC will be responsible for development of the final technical report detailing the fabrication of the specimens, conduct of the tests, and results of the inspections. EPRI will be responsible for the development of a section providing the industry's assessment of the testing and results. A draft of the final report will be provided to EPRI for review and comment prior to publication of the report.

ATTACHMENT 2

SCOPE OF WORK
Cast Austenitic Stainless Steel

Table 2. Scope of Activities to be Performed and Funding Responsibilities

Task	Responsibility	Deliverables
Task 1 - Laboratory Examinations	NRC: low-frequency phased array examination of large-bore and small-bore CASS specimens	Report detailing examination results
	NRC: in-situ microstructural characterization	
Task 2 - Probabilistic Approach	EPRI: collect data regarding locations of CASS in existing plants, including data such as heats of material	Report listing and describing CASS locations; describing weld specific analyses and susceptible locations
	EPRI: perform weld specific analyses, as required, to determine the most susceptible locations to thermal fatigue	
	EPRI: inspection approach	Develop recommendations for industry regarding inspection locations and frequency of inspections
Task 3 - Eddy Current Testing (ET)	EPRI: investigation of the effectiveness and reliability of ET for the examination of CASS components	Report providing results of investigation
Task 4 - Field Conditions	EPRI: evaluate existing field conditions that may impact CASS examinations performed from either OD or ID of pipe welds	Report listing locations and findings
Task 5 - Define significant flaws	NRC: perform probability of failure calculations using EPRI data collected and developed by EPRI	NRC report discussing in detail scope of approach, basis for approach, and results
Task 6 - Review	NRC and EPRI review results and consider whether analysis of additional specimens is required	Review meeting

Background:

Cast austenitic stainless steel (CASS) material was used extensively in the primary pressure boundary of pressurized water reactors. The ASME Code requires periodic inservice inspection of welds in the primary pressure boundary. The coarse-grained and anisotropic microstructure of CASS material makes it difficult to inspect. The large grain sizes of these materials strongly affect the propagation of ultrasound by causing severe attenuation, change in velocity, and scattering of ultrasonic energy. Thus, the signal patterns originating from flaws can be difficult to distinguish from scatter. In addition, the result of redirection of the sound beam may be that some portions of the material are not examined. This may be problematic for component configurations where examination from the CASS side is required to assess weld conditions on the far-side.

Thermal embrittlement of CASS components in nuclear plants due to time and temperature is well known and has been widely studied. Électricité de France (EdF) representatives have discussed occurrences of thermal embrittlement of CASS materials. Industry organizations have discussed the development of a technical basis for a probabilistic model with the objective of determining the influence of thermal aging embrittlement on the reliability and integrity of CASS components and to quantify the benefits of inspections, mitigations, and other options for managing risk.

The NRC and EPRI have been collecting CASS piping specimens (or materials for fabricating new specimens) for investigation with an emphasis on obtaining material representative of U.S. power plants currently in operation. Vendors have discussed the potential use of CASS in new reactor designs. These specimens will be used in the following study.

Task 1:

NRC will be responsible for conducting laboratory examinations of large-bore and small-bore CASS piping specimens using low-frequency phased-array probes. The focus of the study will be to determine the smallest through-wall flaw that can be reliably detected. Sound field mapping of various CASS microstructures as a function of incident angle, inspection frequency, focal depth, and modality will be conducted. In-situ microstructural characterization methods will be investigated measuring acoustic backscatter as a function of angle. Sizing and detection capability will be analyzed.

Task 2:

EPRI will be responsible, to the extent possible for the material specification records that are available, for collecting data regarding the locations of CASS piping in operating plants. The data is to include information relative to heats of materials. Weld specific analyses will be conducted to determine the locations most susceptible to thermal fatigue. The purpose of this study is to determine which welds need to be examined, i.e., locations that are safety-significant and susceptible. Conversely, the information from the study will be used to determine which locations can be removed from an inspection program or inspected at a reduced frequency.

Task 3:

The NRC conducted a study at PNNL to assess eddy current testing (ET) for detection of surface-breaking cracks in CASS piping from the inside surface of the pipe. The results were published in NUREG/CR-6929, "Assessment of Eddy Current Testing for the Detection of Cracks in Cast Stainless Steel Reactor Piping Components." EPRI will study the effectiveness and reliability of ET for the examination of CASS components. EPRI will provide the results of its ET study to NRC so that the results of the two investigations can be compared relative to an assessment of ET for examining CASS components.

Task 4:

EPRI will collect data regarding locations of CASS in existing plants, including data such as heats of material. EPRI will evaluate existing field conditions that may impact examinations performed from the inside or outside diameter surfaces of CASS piping welds. Weld crowns, counter-bores, or other geometrical restrictions may be found in susceptible examination locations. This data is needed to ensure that specimens used for evaluating UT systems are representative of field conditions. Also, calibration blocks may exist at plants that could be useful for this exercise. EPRI should gather information on calibration block configurations.

Task 5:

NRC will pursue completing the probability of failure approach initiated by Structural Integrity Associates (SIA). For this task to proceed, EPRI will have to obtain agreement from SIA and industry oversight groups. If agreement is obtained, the NRC will hold periodic meetings with EPRI to coordinate approach and review interim/final results.

Task 6:

NRC and EPRI will discuss the results of the CASS tasks above to determine if analyses of additional specimens are required.

SCOPE OF WORK
UT/RT for Repairs, Replacements, and Modifications

Table 3. Scope of Activities to be Performed and Funding Responsibilities

Task	Responsibility	Deliverables
Task 1 -Digital Radiographic Testing Equipment	EPRI: EPRI will be responsible for evaluating DRT equipment through a series of demonstrations with selected detector panels, phosphor plates, and radiation sources.	Report discussing results of evaluations/demonstrations
	NRC: assessment of human factors affecting NDE reliability.	Report discussing results of assessment
Task 2 -Digital Radiographic Testing Inspection	NRC/EPRI: develop cooperative research program to assess DRT inspection variables such as dose, exposure, time, handling (e.g., dust, humidity, temperature), and resolution. Assess the impact of replacing film RT with DRT in nuclear applications currently in use in the nuclear industry.	Specific responsibilities to be jointly agreed upon after above assessments provided

Background:

The industry has developed two ASME Code Cases that would allow the use of UT in lieu of RT, Code Case N-659-2, "Use of Ultrasonic Examination in Lieu of Radiography for Weld Examination, Section III, Division 1, and Code Case N-713, "Ultrasonic Examination in Lieu of Radiography." In response, the NRC conducted a technical gap analysis at PNNL to assess the availability of publications detailing research in the areas of RT, DRT, and UT used in place of RT (applicable to nuclear applications). While the literature surveys found over 600 journal and conference papers and technical reports, and over 100 related documents, it was determined that most of the research was narrowly focused, i.e., specific to an industry need, or to specific material(s). Accordingly, the NRC's Office of Nuclear Regulatory Research (RES) is developing a research program to address some of the knowledge gaps. In response to industry needs, EPRI has initiated a project to evaluate digital radiography (DRT) through a series of equipment demonstrations with selected detector panels, phosphor plates, and radiation sources. In addition, EPRI is assessing the possibility of modifying the Code to allow the acceptance of fabrication flaws that are projected to pose no structural challenge during the life of the plant. Thus, it is important that the capabilities of film RT and DRT be established relative to distinguishing orientations and flaw sizes for nuclear applications.

The NRC program will assess industry research being conducted to: use UT in lieu of RT, and replace traditional film radiography with DRT. PNNL has a 450 kV X-ray machine that will be used in the assessment. The evaluation will also determine the capabilities of the methods based on examination effectiveness and reliability to detect and characterize flaws common to Section III repair and replacement activities and Section XI preservice inspection (PSI) and inservice inspection (ISI) activities.

Task 1:

EPRI will be responsible for evaluating DRT equipment through a series of demonstrations with selected detector panels, phosphor plates, and radiation sources. NRC will be responsible for assessing the human factors that affect NDE reliability.

Task 2:

No studies were found in the literature examining the equivalence of film RT and DRT for nuclear applications. In addition, procedures have not established to optimize DRT for typical nuclear power plant component configurations. EPRI and NRC will assess DRT inspection variables such as dose, exposure, time, handling (e.g., dust, humidity, temperature), and resolution. EPRI and NRC will assess the impact of replacing film RT with DRT in nuclear applications currently in use in the nuclear industry.

SCOPE OF WORK
Documentation of Basis for Appendix VIII

Table 4. Scope of Activities to be Performed and Funding Responsibilities

<table>
<tr><th>Task</th><th>Responsibility</th><th>Deliverables</th></tr>
<tr><td rowspan="3">Task 1 - Review of draft technical report</td><td rowspan="2">NRC: draft report detailing technical basis for current requirements of ASME Section XI, Mandatory Appendix VIII</td><td>NRC: provide draft report to EPRI</td></tr>
<tr><td rowspan="2">EPRI: provide comments/suggestions to NRC</td></tr>
<tr><td>EPRI: review draft report; add specific PDI references as appropriate; add available technical information; possibly include review by now-retired individuals who had strong roles in the formulation of the Code.</td></tr>
<tr><td rowspan="2">Task 2 - Publication of Final Report</td><td>EPRI: review draft final report</td><td>EPRI: provide comments to NRC</td></tr>
<tr><td>NRC: provide draft final report to EPRI</td><td>NRC: provide disposition of comments to EPRI; publish final report</td></tr>
</table>

Background:

Experiments conducted by the Pressure Vessel Research Council (PVRC) between 1971 and 1978 provided the first data to indicate that ultrasonic procedures were not as reliable as "expert" opinion suggested. Later experiments under Programme for the Inspection of Steel Components (PISC) programs proved that minimum ASME procedures were not reliable. In 1977, the NRC initiated a program to address nondestructive examination (NDE) reliability issues. The program produced a technical basis for Research Information Letter (RIL) 113, "Reliability of Inservice Inspection of Primary Piping Systems," dated January 29, 1981, recommending the need for nondestructive examination (NDE) performance demonstrations. Large leaking cracks in pipes were discovered after inspections had been performed. Finally, research sponsored by NRC at PNNL in the 1980s indicated that "reliable" ultrasonic inspection could not be written into procedures and that inspection procedures were not capable of describing precisely how to differentiate between geometric or metallurgic indications and cracks.

Representatives of the industry, ASME Code, and NRC met and agreed that major improvements in the quality of inservice inspection were needed and that qualification of NDE systems might be the answer. It was determined that the ASME Section XI Code committees should develop qualification requirements. The efforts of the ASME Code committees resulted in Appendix VIII on ultrasonic testing system performance demonstrations, which was approved by the ASME Boiler and Pressure Vessel Standards Committee in early 1989 and approved by the Board on Nuclear Codes and Standards in mid-1989. The Appendix was published as part of the 1989 Addenda to the ASME Code Section XI. The rules of Appendix VIII marked a revolutionary change in the conduct of inservice ultrasonic examination requirements for piping and reactor pressure vessels; rather than prescriptive requirements, the concept of performance demonstration was developed. The industry initiated the Performance Demonstration Initiative (PDI), which is administered by the Electric Power Research Institute (EPRI), to ensure that inspectors were qualified per the requirements of Appendix VIII.

As indicated by the dates above, a great deal of time has passed since the requirements in ASME Section XI, Appendix VIII, were developed. As technology improves, there has been a desire to use new the technology for inservice inspection. During the consideration of appropriate procedure and equipment qualifications, questions have been raised regarding the technical bases behind current requirements. In addition, many of the individuals that conducted the research showing the need for performance demonstration, or that were responsible for the development of Appendix VIII, have retired or are about to retire. A technical basis document is needed to ensure that the basis for the development of Appendix VIII is not lost, and to provide ASME Code users with an understanding of the technical rationale for the requirements. The NRC tasked PNNL with developing such a technical letter report. A draft has been developed.

Task 1:

PNNL involved with research leading to the need for Appendix VIII and instrumental in the development of the Appendix VIII requirements have contributed to draft technical letter report (TLR). EPRI personnel that administer Appendix VIII could provide valuable insights/input that could vastly improve the TLR. The NRC will provide a copy of the draft TLR to EPRI. EPRI will review the draft report to provide comments, additional technical basis, and references where appropriate. A revised draft will be provided to the NRC. EPRI's review may include solicitation of input from retired individuals who had prominent roles in the development of Appendix VIII.

Task 2:

The NRC will publish the final TLR as a publicly available report.

SCOPE OF WORK
RMSE – ID Pipe Examinations Depth Sizing

Table 5. Scope of Activities to be Performed and Funding Responsibilities

Task	Responsibility	Deliverables
Task 1: Assessment of PDI Data	NRC: PNNL will sign non-disclosure statement; send individual to EPRI NDE Center to assess data in cooperation with EPRI personnel	EPRI: provide draft report to PNNL with assessment of performance demonstrations for DMW ID piping examinations relative to meeting 0.125 inch RMSE requirement
	EPRI: provide non-disclosure statement to PNNL; provide individuals to query database and assess data	PNNL: review draft EPRI report; provide comments to EPRI
	-------	EPRI: publish final report
Task 2: Development of Technical Basis for Alternative Approach (If needed [based on results of Task 1])	EPRI: develop a white paper describing industry issues with regard to difficulties in meeting 0.125 inch RMSE criteria; white paper will include a technical basis for a proposed alternative to current RMSE criteria	EPRI: provide white paper to NRC and ASME, Section XI
	NRC: provide technical expertise when requested by EPRI relative to development of white paper; review final draft of white paper	NRC: consider white paper relative to current requirements of Section XI, Appendix VIII

Background:

During periodic discussions between NRC staff and representatives from the EPRI and the Performance Demonstrative Initiative (PDI), PDI representatives noted that vendor personnel have not been able to pass the root mean square error (RMSE) depth sizing requirement for dissimilar metal weld (DMW) examinations from the inner diameter (ID) of piping. Factors that can affect ID qualifications are pipe wall thickness, surface waviness, surface geometry, through-wall flaw depth, and transducer size. Industry representatives have discussed the difficulties in meeting the requirement and provided developed alternatives for a revised RMSE screening criterion.

The NRC transmitted a letter to the chair of the PDI on November 8, 2010, requesting that the DMW pipe performance demonstration database be queried to assess the results of qualifications. Specifically, information regarding demonstrations performed from the inside pipe surface would be used to assess results relative to the RMSE requirement.

The results of the data search are needed to develop a technical basis report that would support a revision to the current RMSE requirement (as supported by the data).

Task 1:

PNNL will sign a non-disclosure statement with EPRI for the purpose of reviewing PDI data as related to the DMW ID examinations. EPRI will provide individual(s) to query the database, and EPRI and PNNL personnel will jointly assess the data. EPRI will provide a draft report to PNNL documenting its assessment of the data relative to ability to meet the ID 0.125 inch RMSE criterion. PNNL will review the draft report and provide comments to EPRI. EPRI will publish a final report.

Task 2:

If the technical basis developed and described in the final EPRI report supports a revision to the RMSE requirement, EPRI will be responsible for developing a white paper to support a change in the current 0.125 inch requirement. The white paper will describe industry issues with regard to difficulties in meeting 0.125 inch RMSE criteria, and an adequate technical basis to support the proposed alternative(s) to the current requirement. The NRC will provide technical expertise if requested by EPRI and will review the white paper prior to finalization. EPRI will transmit the final report to NRC and ASME, Section XI. The purpose of transmitting the white paper to the ASME would be to provide the technical basis for any requested changes to Section XI, Appendix VIII. The white paper would provide the necessary information for the NRC staff to consider any requested changes to regulations.