

PWR Steam Generator Management

Program Overview

Program Description

Materials degradation in steam generators is impacted by many factors, including water chemistry, inspection limitations, material performance issues, and the presence of foreign objects. Greater understanding of these factors and their integrated impacts will lead to more effective tools to predict the potential for degradation and more effective inspection and mitigation techniques to identify and address degradation.

The Steam Generator Management Program (SGMP) conducts research to ensure the safe, reliable, and economic operation of steam generators in pressurized water reactor plants. Research activities target identification and mitigation of various forms of steam generator degradation, foreign object assessments, optimized operation of replacement steam generators, water chemistry, in-service inspections, and tube integrity.

Research Value

The Steam Generator Management Program drives greater consistency in managing steam generator issues across the nuclear fleet. The program develops guidance for existing issues such as degradation in steam generators with original Alloy 600 MA tubes, as well as emerging issues such as the early and reliable detection of degradation in steam generators with the more corrosion-resistant Alloys 600 TT and 690 TT tubes. SGMP participants gain access to the following:

- Guideline documents that reduce the potential for steam generator tube ruptures and forced leakage outages, which can cost an estimated \$5 to \$20 million per event.
- Better tools for integrity assessments, reducing unnecessary examinations that can cost an estimated \$1 to \$2 million per plant.
- Chemistry controls that can delay the onset of corrosion and mitigate steam generator fouling.
- A database of worldwide steam generator information related to degradation, used to assist utilities with decisions on steam generator operation and maintenance.

Approach

The Steam Generator Management Program applies an integrated approach for managing steam generator materials degradation in pressurized water reactors. The program develops guidance through improved understanding of how multiple variables impact steam generator operation and maintenance, including thermal-hydraulics, water chemistry, tubing materials, inspection techniques, and tube-plugging/repair criteria. Specific activities include the following:

- Coordinate industry response to unanticipated technical and regulatory issues that affect the operation of steam generators.
- Develop water chemistry control techniques to minimize corrosion product transport, fouling, and corrosion damage to steam generator tubes.
- Maintain steam generator degradation database to catalog industry experience with degradation mechanisms and mitigation options.
- Develop faster, more accurate methods for examining steam generator tubes, plugs, tube support structures, secondary side deposits, and foreign objects.
- Conduct thermal hydraulic studies to evaluate conditions in operating steam generators that could lead to tube wear, foreign object damage, flow-induced vibration damage, and reduced performance due to deposit buildup.

Accomplishments

The Electric Power Research Institute's (EPRI's) Steam Generator Management Program supports nuclear power industry efforts to minimize the potential for steam generator tube ruptures, forced leakage outages, and other steam generator integrity issues. Accomplishments include both technology development and technical support, spanning more cost-effective nondestructive evaluation techniques for steam generators to technical justification for regulatory issues.

- Continued updates to guideline documents implementing the requirements of NEI 97-06, a self-imposed industry requirements document that describes fundamental elements of a nuclear plant's steam generator program.
- Conducted technical analysis to demonstrate that potential cracks are not capable of causing steam generator divider plate failure.
- Supported regulatory acceptance of the generic license change package TSTF-449, which describes inspection frequency recommendations for maintaining steam generator tube integrity.
- Conducted field demonstrations of chemistry control and dispersants to mitigate steam generator corrosion and fouling.
- Developed and qualified automated eddy current data analysis software algorithms to improve inspection accuracy and efficiency, leading to improved inspection reliability and reduced inspection costs.
- Developed the Steam Generator Degradation Database, which tracks steam generator degradation experience across the nuclear fleet.

Current Year Activities

Steam Generator Management Program R&D for 2010 will focus on determining the root causes of various forms of steam generator degradation; developing mitigating actions; providing input to replacement steam generator specifications; and establishing guidelines for water chemistry, in-service inspections, and tube integrity. Specific efforts include the following:

- Publish *PWR Primary-to-Secondary Leak Guidelines, Revision 4*.
- Develop a model for assessing tube wear due to foreign objects.
- Develop nondestructive evaluation (NDE) capabilities to reliably detect steam generator foreign objects.
- Develop software to perform site-specific data analyst performance demonstrations (SSPD).
- Develop and conduct a steam generator engineer training course.
- Perform finite element analysis and experimental studies to better understand the long-term effects of stresses in the tubesheet region of Alloy 600TT tubes.
- Transfer EPRI-developed eddy current data analysis algorithms into commercial software to improve inspection accuracy and reduce inspection duration.
- Develop experience-based models that can be used to predict the rate of deposit buildup and the rate of tube corrosion under the deposits as a function of time.

Estimated 2010 Program Funding

\$7.3 million

Program Manager

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Summary of Projects

Project Number	Project Title	Description
P41.01.02.01	SGMP Emerging Issues	Not all steam generator operational and regulatory issues can be anticipated and included in annual plans. An Emerging Issues fund is set up to address unanticipated and emerging issues of high priority throughout the year. The SGMP Integration Committee evaluates and determines candidate emerging issues to be addressed by this fund. Information developed will be distributed to SGMP members.
P41.01.02.02	PWR Steam Generator Management/NEI 97-06 Structural Integrity Assessment and NDE Field Support (QA)	While retaining nuclear safety as the primary objective, plant owners and operators also must focus efforts on maintaining industry steam generator programs and resolving current and near-term engineering, regulatory, and inspection issues. A principal focus is to ensure safety by maintaining steam generator tube integrity. Other current issues of concern include divider plate cracking, the detection and sizing of wear caused by foreign objects and the impact on tube integrity, improved leak rate modeling, determining inspection system uncertainties for all degradation mechanisms.
P41.01.02.03	Steam Generator Supplemental Programs & User Groups	The products resulting from base-funded projects sometimes lead to further research that addresses a specific issue for a subset of the original funding group. Issues addressed may include development of additional capabilities to available software products, development of a database to support alternate tube repair criteria, generic review of newly developed chemical additives, and review of new industry issues that may have generic implications. Research results will be provided to those companies that funded the work.
P41.01.02.03b	ATHOS	ATHOS, Version 3.1, was released in 2008. SGFW, Version 1.1, was released in 2009. Future releases are not planned. In 2010, members of the user group receive access to technical experts that provide software support and can address software bugs.
P41.01.02.04	Steam Generator Materials Performance and Thermal Hydraulics	This project conducts longer-term research to address steam generator issues related to thermal-hydraulics and materials.
P41.01.02.05	Steam Generator NDE R&D	Through the products of the Nondestructive Evaluation (NDE) Research and Development project, industry steam generator programs will be enhanced to reflect technology and cost improvements and address existing and emerging industry inspection issues.
P41.01.02.06	Steam Generator Advanced Water Chemistry	Development of guideline documents, chemistry technologies, and predictive models to provide utility chemists with the best resources to optimize chemistry for safe, reliable, and long-term steam generator operation.
P41.01.02.07	Steam Generator Program Elements	This project includes elements related to EPRI's Steam Generator Degradation Database and the <i>PWR Primary-to-Secondary Leak Guidelines</i> . Recent revisions to the SGDD have implemented a new, user-friendly interface. In 2009, Version 7.0 was released to complete the transformation to the new, user-friendly interface and also included updated reporting features. Results of a peer review of SGDD, conducted in 2009, will be incorporated in the 2010 release (Version 7.1). The <i>PWR Primary-to-Secondary Leak Guidelines</i> are being revised (Revision 4).

SGMP Emerging Issues (058768)

Key Research Question

Not all steam generator operational and regulatory issues can be anticipated and included in annual plans. Emerging issues of high priority often must be addressed in a timely manner. In addition, set-aside funds are now a requirement of the Materials Executive Oversight Group (MEOG).

Approach

An Emerging Issues fund is set up to address unanticipated and emerging issues of high priority throughout the year. The Steam Generator Management Program (SGMP) Integration Committee evaluates and determines candidate emerging issues to be addressed by this fund.

Impact

- Ability to address emerging technical and regulatory issues in a timely manner
- Set-aside funding to eliminate/reduce impact on ongoing planned projects

How to Apply Results

Information developed will be distributed to Steam Generator Management Program (SGMP) members via SGMP information letters, interim guidance, technical reports, and workshops.

PWR Steam Generator Management/NEI 97-06 Structural Integrity Assessment and NDE Field Support (QA) (061426)

Key Research Question

While retaining nuclear safety as the primary objective, plant owners and operators also must focus efforts on maintaining industry steam generator programs and resolving current and near-term engineering, regulatory, and inspection issues. A principal focus is to ensure safety by maintaining steam generator tube integrity. Other current issues of concern include divider plate cracking, the detection and sizing of wear caused by foreign objects and the impact on tube integrity, improved leak rate modeling, and determining inspection system uncertainties for all degradation mechanisms.

Approach

This project is conducted under two committees, the Nondestructive Evaluation Committee and the Engineering and Regulatory Technical Advisory Committee. The principal focus of these groups is to ensure steam generator tube integrity through thorough inspections, condition monitoring, and operational assessments. The cornerstone product is support for NEI 97-06 reference documents, in particular, the *SG Examination Guidelines* and its qualification program, the *SG Integrity Assessment Guidelines*, the *Steam Generator Primary-to-Secondary Leakage Guidelines*, and the *SG In Situ Pressure Test Guidelines*.

Impact

- Minimize the potential for steam generator tube ruptures and forced leakage outages, which can cost \$5 to \$20 million per event.
- Better tools for integrity assessments, which can reduce unnecessary examinations costing \$1 to \$2 million per plant.

How to Apply Results

Information is detailed in the SGMP guidelines, whose implementation is mandated by NEI 97-06 and NEI 03-08. Members use this information to develop in-house procedures in compliance with Technical Specifications and NEI 97-06 requirements.

2010 Products

Product Title & Description	Planned Completion Date	Product Type
Steam Generator Engineering Training Course 2: This product is the training material in student handbook format that will be delivered after the second Steam Generator Engineering Training Course.	03/31/10	Technical Update
Investigation of Steam Generator Secondary Side Degradation: Since early 1990s, material loss due to flow-assisted corrosion (FAC) has been detected in carbon steel components within the steam drums of Westinghouse steam generators. This product will document a technical basis/understanding of the occurrence of FAC, acceptance criteria for degradation detected, inspection recommendations, and mitigation recommendations.	05/31/10	Technical Report
Onset of Fatigue Crack Growth: This project addresses a regulatory issue regarding the onset of fatigue crack growth after primary-to-secondary leakage of a degraded steam generator tube. Nuclear Regulatory Commission (NRC) data suggest leakage would increase significantly under constant pressure. This report will document the relevance of the NRC test data to operating steam generators.	08/31/10	Technical Report
Foreign Object Prioritization Strategy for Triangular Pitch Steam Generators: This product provides a listing of typical foreign objects and the wear damage that they have caused. Based on experience, a categorization of foreign objects is given that could allow some parts to remain in service while requiring others to be removed. This product also provides thermal/hydraulic results and critical area maps for triangular pitch steam generators.	03/31/10	Technical Report
Conduct EPRI SG Engineering Training Workshop: This product is part of a two-year project to provide a comprehensive training program for steam generator (SG) engineers. The first workshop was held in 2008 and provided a baseline of SG engineering information. The 2009 class focuses on tube integrity, and the 2010 class will focus on nondestructive evaluation (NDE) and administrative products such as databases.	12/30/10	Workshop, Training, or Conference
Site Specific Performance Demonstration (SSPD) Version 3.0: Update of existing software product to move from a UNIX platform to a PC compatible platform. This software is used by the customer to develop site-specific testing (written and practical) for steam generator eddy current analysts.	12/31/10	Software
PDD/QDA Version 5.1: Update for the Performance Demonstration Database / Qualified Data Analysts (PDD/QDA) web-based software to move from a UNIX platform to a PC compatible platform.	12/31/10	Software
29th Annual EPRI Steam Generator NDE Workshop: Conduct 29th annual Electric Power Research Institute (EPRI) Steam Generator NDE workshop. This workshop brings together a worldwide collection of steam generator nondestructive evaluation (NDE) experts from utilities, nuclear steam supply system (NSSS) vendors, NDE service organizations, regulatory bodies, NDE equipment manufacturers and universities to exchange experiences, information, and views on issues related to the NDE of steam generator tubing. Presenters will share results from ongoing research that address and improve inspection techniques for assessing steam generator tube integrity.	07/30/10	Workshop, Training, or Conference
Maintenance and Update of ETSS Documents: This project documents performance indices of eddy current and ultrasonic techniques used in examining steam generator tubing. This includes both existing and new technology.	12/31/10	Technical Resource

Future Year Products

Product Title & Description	Planned Completion Date	Product Type
Rev. 4 of In Situ Pressure Test Guidelines: Guideline document that provides requirements for performing in situ pressure testing of steam generator tubes. This document is a required guideline for implementation of NEI 97-06.	07/31/11	Technical Report
Rev. 8 of SG Examination Guidelines: Guideline document that supports requirements of NEI 97-06 and NEI 03-08 for nondestructive evaluation of steam generator tubing.	12/23/11	Technical Report

Steam Generator Supplemental Programs & User Groups (055076)

Key Research Question

The products resulting from base-funded projects sometimes lead to further research that addresses a specific issue for a subset of the original funding group. Issues addressed may include development of additional capabilities for available software products, development of a database to support alternate tube repair criteria, generic review of newly developed chemical additives, and review of new industry issues that may have generic implications.

Approach

Electric Power Research Institute (EPRI) products are developed to address the needs of Steam Generator Management Program (SGMP) utility members. The consensus method of prioritizing projects allows the majority of utility members to benefit from each product. When a proposed project would benefit a small subset of the SGMP members, such projects can be funded by this subset. For example, EPRI software codes have been developed to assess the thermal hydraulic conditions present in steam generators and to determine the rate of tube wear from both steam generator support structures and foreign objects. Although the basic code was developed and validated by SGMP member utilities, user groups can be created to identify and fund the development of new code features.

Impact

- Ability to address plant-specific steam generator research needs
- Ability to address research needs for a subset of utilities that have a common issue

How to Apply Results

Research results will be provided to those companies that funded the work. The method of applying the research would depend on the specific product.

ATHOS (00S580)

Key Research Question

Electric Power Research Institute (EPRI) software codes ATHOS and SGFW were developed to assess thermal-hydraulic conditions and flow-induced vibration in a steam generator, respectively. Although the basic codes were developed and validated, a user group was created to identify and fund the development of new code features. After two decades of maintaining the ATHOS code, EPRI decided to cease maintenance of the code at the end of 2010 based on the limitations of the older code technology. However, EPRI will develop a long-term plan for the next generation of thermal-hydraulic steam generator codes.

Approach

Utilities that identify specific technical needs related to ATHOS or SGFW can contact EPRI for technical support. Technical needs include assistance with initial code installation, software set-up and execution, and technical questions about software calculations.

Impact

- More effective use of ATHOS or SGFW software, supporting utility decision-making
- Ready access to technical support to address specific application issues

How to Apply Results

Participants apply results through direct interactions with EPRI experts, who assist utilities in the installation, application, and interpretation of software output.

Steam Generator Materials Performance and Thermal Hydraulics (061428)

Key Research Question

Foreign objects and tube wear can threaten safe and reliable steam generator operation. An understanding of these phenomena is needed so that predictive tools can be developed and actions can be taken to minimize the potential for degradation that exceeds tube structural limits.

Corrosion studies on current and planned steam generator tubing materials also are needed to determine the effect of various steam generator environments on the rate of tube degradation, form a basis for recommendations to reduce the potential for degradation, and allow accurate long-term predictions on the initiation and growth of tube degradation.

Approach

Conduct experiments and computational simulations to provide more accurate estimates of secondary side flow, foreign object movements, and tube wear rates from both steam generator support structures and foreign objects.

Employ finite element analysis to study the high stress areas of the tube in the tubesheet region, and perform supporting stress corrosion cracking tests to estimate steam generator tube degradation

Impact

- Determine maximum inspection intervals based on predictions of tube wear depths
- Provide guidance on long-term tube repair decisions and strategies
- Improve understanding of stress corrosion cracking in higher-stress tube regions

How to Apply Results

Plant engineers will be able to use Electric Power Research Institute (EPRI) reports to evaluate potential steam generator tube wear damage from foreign objects and wear at steam generator support structures.

Plant engineers will be able to use EPRI reports to evaluate the stresses and, therefore, the potential for stress corrosion cracking in the tubesheet region of 600TT tubes.

2010 Products

Product Title & Description	Planned Completion Date	Product Type
<p>Susceptibility and Mitigation Study for 600 Thermally Treated Tubes: The industry recently experienced stress corrosion cracking (SCC) indications in the tubesheet region of 600TT tubes. The tubesheet region includes tubesheet bulges (inside diameter, or ID) and the expansion transition (ID and outside diameter, or OD). This project will evaluate the residual stresses in this region. The technical report will include a literature review, finite element analysis of residual stresses, and stress index testing results.</p>	12/31/10	Technical Report
<p>PWR Steam Generator Tube Wear - Alloy 690/Alloy 690, Alloy 690/316: Experiments conducted in a long-term wear test facility will be used to develop wear coefficients for 690/690 and 690/316. Such wear coefficients can be used in predicting support wear and foreign object wear in steam generators.</p>	12/31/10	Technical Report
<p>Foreign Object Wear Modeling: Advanced computational fluid dynamics is used to determine the dynamic fluid forces on foreign objects on the secondary side of a steam generator tube bundle. The fluid force results are used to determine tube wear from a foreign object.</p>	12/31/10	Technical Report

Steam Generator NDE R&D (061427)

Key Research Question

Current inspection methods for steam generator tubes are limited in their ability to detect and size tube degradation. For utilities that have replacement steam generators, inspection limitations may limit the length of the inspection interval, eliminating possible cost-savings inspections. In addition, inherent errors and inconsistencies associated with manual data analysis can potentially be eliminated through the development and qualification of automatic data analysis algorithms.

Approach

Tools will be developed to improve the accuracy and efficiency of steam generator inspections. Tools may include software algorithms for automatic analysis of inspection data, creation of a database library for documenting the performance of automatic data analysis software, development of procedures for determining examination technique equivalency, development of guidance for improved data analysis, and development of improved inspection techniques.

Impact

- Reduce steam generator inspection costs
- Reduce steam generator inspection duration
- Improve steam generator flaw detection and sizing accuracy to justify longer inspection intervals

How to Apply Results

With improved flaw detection and flaw-sizing accuracy capabilities, the increased probability of flaw detection and decreased sizing errors could be incorporated into nuclear plant operational assessments to justify longer operating intervals. Algorithms for automatic analysis of inspection data could be used by nondestructive evaluation vendors to improve inspection speed and accuracy during steam generator inspections.

2010 Products

Product Title & Description	Planned Completion Date	Product Type
Standardized Process for Determining Examination Technique Equivalency: Technical report providing a consistent and cost-effective method to evaluate system performance, evaluate technique performance, and demonstrate substitute component equivalency.	03/31/10	Technical Report
Development of Software Tool for Simulating Eddy Current Responses to Various Steam Generator Conditions: Develop an accurate computational model for simulating signals representing steam generator eddy current inspection data and incorporate the model into a user friendly software tool.	03/31/10	Software
Development of Software Tool for Simulating Eddy Current Responses to Various Steam Generator Conditions: Document the development and validation of a computational model for simulating signals representing steam generator eddy current inspection data.	03/31/10	Technical Report
Perform Feasibility Study for Development of a Technique to Accurately Size Loose Part Tube Wear from Steam Generator Secondary Side: Perform a feasibility study on potential nondestructive evaluation (NDE) techniques that may be capable of accurately measuring the dimensions of loose part wear scars from the steam generator (SG) secondary side. As part of the technique evaluation, the issues associated with developing a delivery system also would be considered.	03/31/10	Technical Report
Development of Eddy Current Data Analysis Guidance and Datasets for Detection of Loose Parts and Loose Parts Wear: Decisions regarding inspection frequency and scope may lead to reduced inspection costs by providing an understanding of eddy current technique capabilities for detecting various types of foreign objects. Research tasks will include evaluating bobbin, rotating coil, and array coil detection techniques for various foreign object types utilizing objects obtained from the industry as part of the Electric Power Research Institute (EPRI) Foreign Object Library. The project will develop examination technique specification sheets (ETSS) for the detection and sizing of foreign object wear in the presence of a foreign object. These techniques are expected to increase accuracy in determining tube integrity due to foreign object wear, and may provide the justification for increased inspection intervals.	03/31/10	Technical Report

Steam Generator Advanced Water Chemistry (052334)

Key Research Question

Corrosion product transport into steam generators can foul tube surfaces and create crevice environments for the concentration of corrosive impurities. Improved water chemistry control can minimize this transport mechanism, leading to reduced fouling and corrosion damage within the steam generators.

Approach

Secondary and primary water chemistry guidelines are developed and periodically reviewed and revised as needed to reflect technology developments and industry experience. Advanced technology developments are incorporated in application sourcebooks, which provide assistance to the plant chemists on water chemistry control, including improved amines, dispersant, molar ratio control, and intergranular stress corrosion cracking inhibition (boric acid and TiO₂ addition). The influence of amines and dispersants on corrosion product deposition and removal from steam generators continues to be investigated, as well as the role of lead in stress corrosion cracking.

Impact

- Industry guidance in primary chemistry, secondary chemistry, steam generator (SG) lay-up, and hideout return
- Continued assessment of dispersant application to significantly mitigate steam generator fouling
- Improved understanding of high-temperature lead chemistry as a means to develop remedial strategies against lead-induced stress corrosion cracking

How to Apply Results

Plant chemists will include the guidance provided in the Electric Power Research Institute (EPRI) chemistry documents in their plant operating procedures to ensure that steam generator tube corrosion and steam generator tube fouling conditions are minimized. In addition, plant chemists will review the results of EPRI studies on various additives for controlling steam generator tube corrosion and fouling to determine if application at their plants would be advantageous.

2010 Products

Product Title & Description	Planned Completion Date	Product Type
Electrochemical Evaluation of PbSCC Mechanism: The objective of this work is to perform electrochemical polarization scans in steam generator environments to evaluate the effect of environment on the electrochemistry of Pb and Ni. These scans will better define when Pb would be plated and when it will be soluble in more realistic crevice environments.	12/31/10	Technical Report
Dispersant Application during Steam Generator Wet Layup: Dispersant application for steam generator wet layup could significantly increase the mass of corrosion product removed from the steam generators during an outage. This product would provide the information needed to support a trial application at a plant, including an application procedure and generic qualification template.	12/31/10	Technical Report
PWR Chemistry Events Sourcebook: This product will provide utility personnel (for example, plant chemists, systems engineers, and managers) with a sourcebook documenting examples of chemistry excursions and lessons learned from those excursions.	12/31/10	Technical Report
PWR Monitoring and Assessment: This product will provide a valuable tool for investigating and identifying correlations between chemistry parameters and operating experiences, including benchmarking. In addition, it will provide supporting information to strengthen and improve the technical guidance documented in the Electric Power Research Institute (EPRI) pressurized water reactor (PWR) water chemistry guidelines.	12/31/10	Technical Update

Future Year Products

Product Title & Description	Planned Completion Date	Product Type
Development of Predictive Models for Deposit Accumulation and Corrosion on the Secondary Side of Steam Generators: Experienced-based empirical models can predict the probable rates of deposit accumulation and tube corrosion at support intersections and at top of tubesheet areas of steam generators. This project will build on completed work on a quantitative model characterizing line contact support plate fouling, which was funded by the Electric Power Research Institute (EPRI) Technology Innovation program.	06/30/11	Technical Report

Product Title & Description	Planned Completion Date	Product Type
MULTEQ Database Update: MULTEQ is the leading tool for understanding the primary and secondary chemistry environment. The MULTEQ database is continually reviewed and revised by a select committee of experts. This project will provide the latest update and improvements to the MULTEQ database.	12/30/11	Technical Update
Evaluation of Additives for Inhibiting PbSCC: The objective of this work is to identify possible field remedial actions that can be implemented to mitigate lead stress corrosion cracking (PbSCC). Electrochemistry will be used to evaluate the effectiveness of additives that slow plating kinetics and precipitate Pb in removing Pb from solution.	12/30/11	Technical Report
PWR Monitoring and Assessment: This product will investigate and identify correlations between chemistry parameters and operating experiences, including benchmarking. In addition, it will provide supporting information to strengthen and improve the technical guidance documented in the Electric Power Research Institute (EPRI) pressurized water reactor (PWR) water chemistry guidelines.	12/30/11	Technical Update

Steam Generator Program Elements (052592)

Key Research Question

Utility management and steam generator engineers can make more effective operational and maintenance decisions if fully informed by industry steam generator operating experience. A common source of up-to-date and easily retrieved steam generator information, including degradation mechanisms, can provide this capability.

The Electric Power Research Institute (EPRI) *Primary to Secondary (P/S) Leak Guidelines* is a directive document in NEI 97-06, which requires that an industry committee be convened every one to two years to review this guideline document and determine the need for revision.

Approach

A database of worldwide steam generator information, Steam Generator Degradation Database (SGDD), has been developed and placed on an Internet site accessible to all EPRI members. Maintaining this database with complete and accurate data, reported in a consistent manner, is essential for meeting utility information needs.

The EPRI *Primary to Secondary Leak Guidelines* document is reviewed on a periodic basis and revised when recommended by an industry guidelines review committee.

Impact

- SGDD helps to ensure the safe and reliable operation of steam generators by providing data to plant engineers to help in determining inspection scope, planning for tube repair activities, and determining the effectiveness of various steam generator corrective action programs (for example, chemical cleaning).
- The *Primary to Secondary Leak Guidelines* help ensure the safe and reliable operation of the steam generators by providing information on leak detection methods and defining actions based on leak rate.

How to Apply Results

SGDD information assists plant engineers in preparing various steam generator assessment documents. SGDD information on industry steam generator experience is essential in determining if negative industry events could occur at a plant and in planning for potential events that affect steam generator safety or operation.

The *Primary to Secondary Leak Guidelines* enable plant operations staff to ensure that leakage does not exceed allowed leakage values.

2010 Products

Product Title & Description	Planned Completion Date	Product Type
<p>Steam Generator Degradation Database (SGDD), Version 7.0: SGDD is a web-based database that contains steam generator information including steam generator design, degradation mechanisms, and inspection results. The database is continually evaluated to improve the usability and accessibility of data. During 2009, a peer review of the SGDD is being conducted. Recommendations from the peer review team will be incorporated into the release of Version 7.1.</p>	07/01/10	Software
<p>PWR Primary-to-Secondary Leak Guidelines, Revision 4: <i>PWR Primary-to-Secondary Leak Guidelines, Revision 3</i>, was published in 2004. In 2008, the Steam Generator Management Program (SGMP) decided that a revision to the guidelines was warranted. The guideline revision process began in 2009 and focused on review of Section 3, clarification of leak rate methodologies, and recent operating experience. Revision 4 of the guidelines will be updated with relevant information and a new section summarizing the requirements.</p>	12/31/10	Technical Report