

Foreign Trip Report

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Purpose of the Trip:

The primary purpose of the trip was to participate in the IAEA sponsored technical committee meeting (TCM) on Minimizing Aging in Nuclear Power Plants. Jit Vora also took this opportunity to discuss potential topics for international collaborative research on wire system aging with the representatives of the participating member states organizations.

Meeting Place and Dates:

International Atomic Energy Agency (IAEA) headquarters, Vienna, Austria. June 26-28, 2001.

TCM Objectives:

The specific objectives of the TCM were:

- (1) To exchange technical information on engineering, operations and maintenance practices/actions used to minimize aging of systems, structures and components (SSCs), including premature aging.
- (2) To present and discuss a draft report on minimizing aging in NPPs prepared by the IAEA.

Background:

Since early 1980's, the U.S. NRC took a lead worldwide in implementing a comprehensive research program to understand and manage aging in operating nuclear power plants. Over the period of the last 15 years, the NRC staff actively participated in the activities of the IAEA project on Safety Aspects of NPP Aging.

The IAEA initiated information exchange on safety aspects of NPP aging in 1985 to increase awareness of the emerging safety issue relating to physical aging of plant systems, structures and components. In 1989 a systematic IAEA project was implemented with the aim at assisting Member States in understanding and managing aging in SSCs important to safety so as to ensure their integrity and functional capability throughout their service life. This overall project integrates information on the evaluation and management of safety aspects of NPP aging generated by Member States into a common knowledge base, and derives guidance and assists Member State in the application of this guidance. The major elements of the overall IAEA project on Safety Aspects of NPP Aging can be categorized as:

1. Awareness of physical aging of SSCs and management of its detrimental effects.
2. Provide programmatic guidelines to understand and manage aging in SSCs
3. Provide component specific guidelines, and
4. Provide aging management review guidelines

As a part of this overall program, IAEA is currently developing a document on "Good Practices for Minimizing Premature Aging." In the final report, specific examples will be included on aging management issues and their resolution aimed to minimize future aging. The significance of the examples is to demonstrate that the plant aging issues may have their origins in any or many parts of the plant life cycle, including design and fabrication, installation, operation and

maintenance. Similarly, the implementation of action plan to minimize the detrimental effects of aging may involve many elements of the plant's organizational and management structure.

The TCM was organized to provide guidelines to minimize aging of systems, structures and components, including premature aging by recognizing the root causes and sources of their aging and by taking a proactive approach to aging management. The root causes may include errors, oversights or omissions in design, fabrication, installation, operation and maintenance. While the proactive approach aims to minimize or slow down aging degradation of an SSC through operations, maintenance and engineering actions designed to control significant aging mechanisms.

TCM Summary:

During June 26-28, 2001, Jit Vora, MEB/DET/RES and P.T.Kuo, RLSB/DRIP/NRR participated in the IAEA sponsored technical committee meeting on Minimizing Aging in Nuclear Power Plants. We made a joint presentation reflecting NRC activities related to plant aging research and the Generic Aging Lessons Learned (GALL) effort for license renewal. Thirty representatives from 19 different countries attended the TCM. They discussed their experiences related to "premature aging" and provided insights with specific examples on minimizing their detrimental effects. The examples included SCC in BWR piping and reactor internals, vibration failures of small diameter pipe welds, corrosion of S.G. tubes, RPV embrittlement, erosion-corrosion of joints and nozzles, IGSCC of core shroud and piping, thermal stratification and fatigue of feedwater lines, leak in a ECCS elbow and cable aging. Since many participants represented NPP operators, their experiences and contributions related to minimizing aging in NPPs are useful to the RES and NRR programs related to plant aging research and guidance documents for license renewal.

Outcome/Benefits:

The overall outcome/benefits to the NRC can be characterized in two areas:

1. RES Activities Related to Plant Aging Research

In his presentation Mr. Sagawa of Hitachi indicated that they had a few small bore piping failures. Japan is now performing small bore piping inspections using NDE techniques on a routine basis. Mr. Sagawa stated that they did not have any difficulties in performing the NDE inspections on the small bore piping (the GALL report specifies only one time inspection of small piping for license renewal). MEB/DET/RES staff should make appropriate contacts with the Japanese organizations and obtain the relevant information with regard to their NDE techniques for small bore piping. Similarly, technical information exchange with Japan would be beneficial on their research programs and findings on, SCC in BWR piping and reactor internals and wall thinning due to erosion/corrosion in piping. These Japanese programs for aging management of long-lived passive components and structures are impressive and the NRC can benefit from their experience.

Both France (EDF) and Switzerland (GSKL) have implemented comprehensive aging assessment and aging management programs involving activities related to (1) Prioritization of SSCs, (2) Electrical Components, (3) Civil Structures and (4) Mechanical Components. On these topics bilateral information exchange with these two countries would be beneficial to the ongoing RES activities related to plant aging research.

The representatives from Japan, France, United Kingdom and Switzerland indicated their willingness to participate in the planned RES sponsored International Conference on Wire System Aging in FY 2002. They suggested continuing dialogue with NRC on collaborative research on cable aging.

2. NRR Activities Related to License Renewal and the Development of the Guidance Documents

The fundamental difference in aging management between other member countries and the NRC license renewal rule requirements is the focus of aging management. Other countries focus their aging management on aging mechanisms and the NRC license renewal rule on aging effects. Of interest to note is that the 1991 NRC license renewal rule also emphasized the identification and evaluation of aging mechanisms for systems, structures, and components within the scope of license renewal. The rule was amended in 1995. One of the major changes was the shift of focus from the emphasis on aging mechanisms to aging effects. Although mitigating the effects of aging can not be completely divorced from understanding the aging mechanisms, the Commission determined that an approach that focus only on identification and evaluation of aging mechanisms could constitute an open-ended research and that a shift in focus to managing the detrimental effects of aging for license renewal reviews is appropriate. The participants showed a keen interest in the GALL report and will likely use it as a reference document for aging management of long-lived, passive components and structures in their operating nuclear power plants.

Some of the participants indicated that their countries start implementing aging management practices in their operating reactors as part of their 10 year Periodic Safety Reviews. Based on the reviews of Calvert Cliffs and Oconee license renewal applications and the work on GALL, our experience shows current plant programs can be credited for about 70% of the aging management programs needed for license renewal. The remaining 30% of the aging management programs are either augmented current plant programs or identified as plant-specific new programs. Many countries have not taken proactive actions to systematically establish new or augmented programs for managing aging degradation or effects.

Meeting Participants:

The meeting participants included representatives from plant operators, designers, architects and consultants. Attachment 1 provides a listing of the meeting participants representing 19 different countries.

Technical Papers and Presentations:

Attachment 2 lists the technical papers and presentations that were made at the TCM. A complete set is available in MEB/DET/RES file and in rooms T-10 D19 and O-12 D16.

MEMORANDUM TO: Nilesh C. Chokshi, Chief
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FROM: Jitendra P. Vora, Team Leader
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During June 26-28, 2001, we participated in the IAEA sponsored Technical Committee Meeting on Minimizing Aging in Nuclear Power Plants. Attached please find a copy of our joint foreign trip report.

Attachment: As stated

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