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Organisation de Coopération et de Développement Economiques
Organisation for Economic Co-operation and Development **14-Feb-2005**

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NUCLEAR ENERGY AGENCY
COMMITTEE ON THE SAFETY OF NUCLEAR INSTALLATIONS

NEA/CSNI/R(2004)9
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INTERNATIONAL DEVELOPMENTS AND COOPERATION ON RISK-INFORMED IN-SERVICE INSPECTION (RI-ISI) AND NON-DESTRUCTIVE TESTING (NDT) QUALIFICATION

Stockholm, Sweden
13-14 April 2004

The enclosed CD-Rom contains full papers and presentations.

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ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

Pursuant to Article 1 of the Convention signed in Paris on 14th December 1960, and which came into force on 30th September 1961, the Organisation for Economic Co-operation and Development (OECD) shall promote policies designed:

- to achieve the highest sustainable economic growth and employment and a rising standard of living in member countries, while maintaining financial stability, and thus to contribute to the development of the world economy;
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- to contribute to the expansion of world trade on a multilateral, non-discriminatory basis in accordance with international obligations.

The original member countries of the OECD are Austria, Belgium, Canada, Denmark, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The following countries became members subsequently through accession at the dates indicated hereafter: Japan (28th April 1964), Finland (28th January 1969), Australia (7th June 1971), New Zealand (29th May 1973), Mexico (18th May 1994), the Czech Republic (21st December 1995), Hungary (7th May 1996), Poland (22nd November 1996), Korea (12th December 1996) and the Slovak Republic (14 December 2000). The Commission of the European Communities takes part in the work of the OECD (Article 13 of the OECD Convention).

NUCLEAR ENERGY AGENCY

The OECD Nuclear Energy Agency (NEA) was established on 1st February 1958 under the name of the OEEC European Nuclear Energy Agency. It received its present designation on 20th April 1972, when Japan became its first non-European full member. NEA membership today consists of 28 OECD member countries: Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Luxembourg, Mexico, the Netherlands, Norway, Portugal, Republic of Korea, the Slovak Republic, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The Commission of the European Communities also takes part in the work of the Agency.

The mission of the NEA is:

- to assist its member countries in maintaining and further developing, through international co-operation, the scientific, technological and legal bases required for a safe, environmentally friendly and economical use of nuclear energy for peaceful purposes, as well as
- to provide authoritative assessments and to forge common understandings on key issues, as input to government decisions on nuclear energy policy and to broader OECD policy analyses in areas such as energy and sustainable development.

Specific areas of competence of the NEA include safety and regulation of nuclear activities, radioactive waste management, radiological protection, nuclear science, economic and technical analyses of the nuclear fuel cycle, nuclear law and liability, and public information. The NEA Data Bank provides nuclear data and computer program services for participating countries.

In these and related tasks, the NEA works in close collaboration with the International Atomic Energy Agency in Vienna, with which it has a Co-operation Agreement, as well as with other international organisations in the nuclear field.

COMMITTEE ON THE SAFETY OF NUCLEAR INSTALLATIONS

The NEA Committee on the Safety of Nuclear Installations (CSNI) is an international committee made up of senior scientists and engineers, with broad responsibilities for safety technology and research programmes, and representatives from regulatory authorities. It was set up in 1973 to develop and co-ordinate the activities of the NEA concerning the technical aspects of the design, construction and operation of nuclear installations insofar as they affect the safety of such installations. The Committee's purpose is to foster international co-operation in nuclear safety amongst the OECD member countries. CSNI's main tasks are to exchange technical information and to promote collaboration between research, development, engineering and regulation organisations; to review the state of knowledge on selected topics of nuclear safety technology and safety assessments, including operating experience; to initiate and conduct programmes to overcome discrepancies, develop improvements and reach consensus on technical issues; to promote co-ordination of work, including the establishment of joint undertakings.

FOREWORD

The CSNI Workshop on "International development and cooperation on Risk-Informed In-Service- Inspection (RI-ISI) and Non-destructive Testing (NDT) Qualification" was held from April 13 to 14, 2004 in Stockholm, Sweden hosted by the Swedish Nuclear Power Inspectorate (SKI).

At its December 2000 meeting, the NEA Committee on Nuclear Regulatory Activities (CNRA) discussed the increasing interest in RI-ISI and issues related to NDT qualifications. The Committee on the Safety of Nuclear Installations (CSNI) then decided to survey the current status of RI-ISI in NEA Member countries. The survey findings led the CSNI to propose that this workshop be held in order to complement and to harmonize R&D activities done by other entities.

CNRA and CSNI concerns could be expressed as follows: Introduction of RI-ISI strategies as well as NDT qualification requirements includes both complex technical aspects and some more fundamental aspects. The further implementations and developments of RI-ISI and NDT qualification approaches have therefore to be followed closely by the regulatory bodies and their technical support organisations. Over the last years several guides and code cases have been developed to facilitate the practical implementation of risk informed in-service inspection programs.

The objective of the workshop was to foster discussion between regulators, utilities and the industry and to contrast the different approaches taken for the further optimization of in-service inspections in nuclear power plants. The workshop also covered R&D activities performed by international and regional task groups.

The Workshop gathered 54 participants from 17 countries including the EC and the IAEA. Key players from the industry and regulatory bodies provided complete and educative views on RI-ISI methodologies, feedback from RI-ISI applications for both actual plants and pilot studies and the needed NDT qualification efforts in NEA Member countries.

The conclusions and recommendations from the workshop are available in the CSNI report referenced NEA/CSNI/R(2005)3[1] "Status Report on International Developments and Cooperation on Risk-Informed In-Service-Inspection (RI-ISI) and Non-Destructive Testing (NDT) Qualification". This report also gives an overview on the current situation in NEA Member countries and regulatory aspects on both the further developments of risk informed ISI and NDT qualification approaches. These complementary documents allow the community to draw a complete picture of the current situation and identify directions for developments and co-operation.

Views expressed in the documents reflect the opinion of the audience of the workshop. They do not bind any organizations or individuals.

This document contains abstracts of papers. A CD-Rom attached to this copy contains full papers and presentations made at the workshop.

[1] NEA/CSNI/R(2005)3 "Status Report on International Developments and Cooperation on Risk-Informed In-Service-Inspection (RI-ISI) and Non-Destructive Testing (NDT) Qualification"

ACKNOWLEDGEMENT

Gratitude is expressed to the Swedish Nuclear Power Inspectorate (SKI) for hosting the workshop and to Mr. Christer Viktorsson, Deputy-Director General of SKI, for introducing the workshop. Special thanks to Mr Lars Skanberg, SKI, vice-chairman of the CSNI Working Group on the Integrity of Components and Structures and to Mrs Karen Gott, SKI, for their help and support and for the excellent organization.

Thanks are also expressed to the Scientific Committee (SC) and to the chairpersons for their effort and co-operation.

Scientific Committee:

Mr. Lars SKANBERG	**SKI, SWD**	**Chairman of the Workshop**
Mr. Claude FAIDY	EDF, FR	Chairman of the CSNI sub-group on the Integrity of Metal Components
Dr. Arne ERIKSSON	JRC-EC	
Dr. Walter NEUMANN	HSK, SWT	
Dr. Syed ALI	NRC, USA	
Ms. Deborah A. JACKSON	NRC, USA	
Mr. Mathet	OECD-NEA	Scientific secretary

Chairpersons:

SESSION 1: RI ISI perspectives	Mr C. Faidy (EdF, FR) Dr A. Eriksson (JRC, EC)
SESSION 2: Important aspects of RI-ISI applications	Mr L. Skanberg (SHI, SWD) Mr V. Chapman (OJVC Consultancy, UK)
SESSION 3: Experiences with RI-ISI applications	Mr Francia (UNESA, SPN) Dr B. Brickstad (SKI, SWD)
SESSION 4: Conclusions on experiences on RI-ISI and needs for further developments	Dr N. Chokshi (NRC, USA) Panelists: Dr S. Ali (NRC, USA), Mr C. Castelao (CSN, SPN), Mr P. O'Regan (EPRI, USA), Mr A. Billington (Westinghouse,BE), Mr L. Skanberg (SKI, SWD), Dr W. Neumann (HSK, SWT), Mr C. Faidy (EdF, FR)
SESSION 5: Requirements and experiences on NDT qualification	Dr W. Neumann (HSK, SWT) Dr C. Birac (EdF, FR)
FINAL SESSION: General discussion - Summary and Conclusions	Mr Lars Skanberg (SKI, SWD)

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Changes in ISI-program scope and extent, Experience so far of efficiency and effectiveness to reduce risk using semi quantitative approaches. Extension of RI ISI to "Break Exclusion Regions" - Motivations and justifications
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Panel discussion on experiences so far and needs for further developments: criteria for acceptability, etc.

Outcomes are reproduced in the status report *NEA/CSNI/R(2005)3 on " International Developments and Cooperation on Risk-Informed In-Service Inspection (RI-ISI) and Non-Destructive Testing (NDT) Qualification".*

Topic 2 NDT Qualification

The enclosed CD-ROM contains papers and presentations.

Introductory speech

Mr Eric Mathet
OECD/NEA-France

It is my pleasure to open this workshop and to welcome each of you on behalf of the NEA.

I would like to thank Mr Viktorson and Mr Skanberg and the staff of SKI for hosting this workshop and for providing the local organization. A successful workshop requires the coordinated effort of a number of people. The organizing committee has put together a good program and I'd like to thank them for that.

One measure of success for an organizing committee is to attract the right attendance. Therefore I am delighted to have attendance which includes a good mix of regulators, researchers, operators and dedicated task groups on today's topics.

This is intended to be a workshop to present the current experience in RI-ISI and in NDE related to RI-ISI, but also a workshop to discuss and contrast different approaches taken for further optimization of in-service inspections and NDE qualification in nuclear power plants.

OVERVIEW ON PRESENT ISI PRACTICES AND FUTURE PLANS

Mr L. Skanberg
SKI-SWD

Contribution on the CD-Rom.

SESSION 1

RI ISI perspectives

Mr C. Faidy (EdF-FR) – Dr A. Eriksson (JRC-EC)

Motive and incentive for RI –ISI, prerequisites, possibilities and limitations for application to different plant parts/ components (piping systems, PRV, SG-tubes, containment), defence-in-depth and safety margin considerations, treatment of high consequence components

Contributions:

USNRC PERSPECTIVE ON RISK-INFORMED INSERVICE INSPECTION

Syed Ali
United States Nuclear Regulatory Commission- USA

This paper summarizes policies and principles used by the United States Nuclear Regulatory Commission (USNRC) for risk-informed regulations in general, and more specifically for the development of current regulations and codes that address risk-informed inservice inspection (RI-ISI). The role of USNRC staff during the development and implementation of codes and regulations for RI-ISI is described. Current regulations are described along with the status of the implementation of RI-ISI at nuclear power plants operating within the United States.

NRWG TASK FORCE ON RISK-INFORMED INSERVICE INSPECTION

Walter Neumann
Swiss Federal Nuclear Safety Inspectorate (HSK)- Switzerland

A Task Force on Risk-Informed Inservice Inspection set up by the Nuclear Regulators' Working Group of the European Union has analysed key aspects associated with the application of risk-informed inservice inspection from a regulatory point of view. The Task Force has reached common views on the subject that will be proposed to the Nuclear Regulators' Working Group.

ENIQ TGR EUROPEAN FRAMEWORK ON RISK INFORMED IN-SERVICE-INSPECTION

Victor Chapman
OJV Consultancy- United Kingdom

Luca Gandossi, Anna Mengolini, Arne Eriksson
JRC Petten- The Netherlands

This paper gives a brief overview of the current situation regarding the ENIQ Task Group on Risk (TGR) ongoing efforts to produce a European framework document on risk-informed in-service inspection (RI-ISI) for the nuclear industry. Several fundamental issues constituting the philosophical and technical basis of RI-ISI were raised by the Nuclear Regulators Working Group during 2003 and were formally addressed by TGR. These positions are presented in this paper.

THE STATUS OF RISK INFORMED IN-SERVICE INSPECTION IN KOREA

Young Hwan Choi[1], Koo Gap Chung[1], and Bag Soon Chung[2]
[1] Korea Institute of Nuclear Safety- Korea
[2] Korea Electricity Power Research Institute- Korea

Recently, it becomes necessary to find a way to improve regulatory efficiency and effectiveness in order to cover the increasing regulatory needs in Korea. In addition, the utility has optimized design and operation of the plant using probabilistic safety assessment (PSA) insight and equipment performance information. According to the increase of the necessity for regulatory improvement using risk information, Korea Institute of Nuclear Safety (KINS) is developing how to adopt risk informed regulation (RIR) in Korean nuclear regulation including risk informed in-service inspection (RI-ISI). In order to reduce the burden from the in-service inspection (ISI), Korean utility also performed the pilot plant study on the RI-ISI application. In this paper, the status of RIR, the regulatory positions on the RI-ISI application and the result of the pilot plant study on the RI-ISI application in Korea are introduced.

SESSION 2

Important aspects of RI-ISI applications

Mr L. Skanberg (SKI- SWD) – Mr V. Chapman (OJVC Consultancy- UK)

Contributions:

PROBABILISTIC SAFETY ASSESSMENT (PSA) REQUIREMENTS FOR USE IN RI-ISI APPLICATIONS

Bengt Lydell
ERIN® Engineering and Research, Inc.- USA

Probabilistic Safety Assessment (PSA) models do not include detailed representations of passive component failures. Based on PSA alone, it is not feasible to establish any direct cause-and-effect relationship between proposed changes in inservice inspection (ISI) examination locations and changes in risk metrics (e.g., core damage frequency, CDF, and large early release frequency, LERF). For this reason special risk-informed inservice inspection (RI-ISI) methodologies have been developed by the American Society of Mechanical Engineers (ASME) and the Electric Power Research Institute (EPRI). In these methodologies PSA is one of several inputs to RI-ISI program development. Use of PSA is made for characterizing the consequences of pressure boundary failures. Relying on insights from the U.S. experience with RI-ISI, this paper summarizes the PSA (scope and quality) requirements.

CSNI/RI-ISI
FAILURE POTENTIAL ASSESSMENTS AND FAILURE PROBABILITY ESTIMATIONS

Helmut Schulz
Gesellschaft für Anlagen- und Reaktorsicherheit (GRS) mbH,
Cologne- Germany

All information relevant to safety is exchanged via the Incident Reporting System (IRS) which is jointly operated by the IAEA and the NEA of the OECD. The evaluation of operating experience with light-water reactors demonstrates that the provisions taken to ensure the function and the integrity of the components have been successful in general, but the design provisions themselves are not sufficient to avoid degradations. In general, it can be stated that the extent of repair and replacement is higher than expected during the design stage for some of the components of PWRs and BWRs. But the developments in the techniques applied for repair and replacement have compensated these deficiencies to a state that the overall plant reliability and safety is not compromised. For pipe failures the OPED data base - which is a development based on the former SKI data base under the umbrella of the OECD - will be a very valuable tool to retrieve information regarding pipe failures and damage mechanisms related to light water reactor systems. Furthermore, it can be used to estimate the likelihood of damage mechanisms in relation to each other as well as investigating frequency of failures. For approaches and models used for risk informed inspection there is a strong necessity to line out the verification basis and limits of application.

SRM/PFM MODEL REQUIREMENTS

B. Brickstad
Swedish Nuclear Power Inspectorate (SKI)- Sweden
T. Schimpfke
GRS, Germany
O. J. V. Chapman
O.J.V. Consultancy Ltd-UK
P. Dillström
Det Norske Veritas AB- Sweden
C. Cueto-Felgueroso
TECNATOM- Spain
C. D. Bell
Rolls-Royce plc- UK

A consortium has been formed, sponsored by the European Commission, to perform a project with the acronym NURBIM. The NURBIM project is focusing on the definition of best practice methodologies for performing risk analyses and establishing a set of criteria for the acceptance of risk quantities that can help Regulatory bodies in Europe to accept Risk-Informed In-Service Inspection (RI-ISI) as a valid tool for managing plant safety. One of the main areas within NURBIM has been Work Package 4 (WP-4) named Review and Benchmarking of Structural Reliability Models (SRMs) and associated software. This paper presents some of the results produced within WP-4. The results of the benchmark studies are used in the process of formulating criteria which should be fulfilled for a suitable SRM and associated software for application of RI-ISI.

QUALITATIVE VERSUS QUANTITATIVE RISK MODELS

Walter Neumann
Swiss Federal Nuclear Safety Inspectorate (HSK)- Switzerland

A review is given on quantitative and qualitative assessment used in risk-informed inservice inspection methodologies and procedures, which have been applied or explored in relation to European nuclear power plants.

SESSION 3

Experiences with RI-ISI applications

Mr Francia (UNESA- SPN) – Dr B. Brickstad (SKI- SWD)

Contributions:

USNRC EXPERIENCE WITH APPLICATIONS OF RISK-INFORMED INSERVICE INSPECTION

Syed Ali
United States Nuclear Regulatory Commission-USA

This paper summarizes policies and principles used by the United States Nuclear Regulatory Commission (USNRC) for risk-informed regulations in general, and more specifically for the regulations and codes that address risk-informed inservice inspection (RI-ISI). It discusses the USNRC review process and the current status of U.S. RI-ISI implementation. The paper also discusses USNRC experience associated with its review of U.S. nuclear power plant RI-ISI applications, some detailed examples of issues and future RI-ISI needs.

RISK-INFORMED INSERVICE INSPECTION EXPERIENCES, PERSPECTIVES AND NEW DIRECTIONS

Patrick O'Regan
EPRI

Risk-informed inservice inspection of pressure boundary components has received widespread application in the USA. Over the next few years, eighty to ninety percent of plants in the USA will have implemented some form of risk-informed inservice inspection. These applications have ranged from full-scope (i.e. Class 1, 2, 3 and some balance of plant piping) to partial scope (e.g. Class 1 piping only, surface examination only). These applications have improved or maintained plant safety while reducing undue burden and worker exposure. In addition, as the application of risk technology to pressure boundary components has matured, new applications have been identified as well as new methods for streamlining plant specific implementation.

DEVELOPMENTS AND LESSONS LEARNED ON IMPLEMENTATION OF RISK-INFORMED INSERVICE INSPECTION METHODOLOGY

A. Billington
Westinghouse Electric Belgium SA
K. Balkey, R. Haessler, N. Palm, P. Stevenson
Westinghouse Electric Company LLC

The Westinghouse Owners Group (WOG) risk-informed inservice inspection (ISI) methodology was granted approval by the U.S. Nuclear Regulatory Commission in 1998 thereby providing an alternative to ASME Section XI Code requirements for the selection of examination locations in nuclear plant piping systems. Since that time, many applications have been developed and implemented within the U.S. Additionally much progress has been made in developing and applying the WOG risk-informed ISI approach in several other countries. This paper focuses on the developments and lessons learned from the generation and implementation of these RI-ISI programs. Also discussed are emerging applications developing from and going beyond risk-informed ISI.

EXPERIENCE WITH RI-ISI APPLICATIONS: THE ROLE OF PIPE FAILURE DATA IN RI-ISI PROGRAM DEVELOPMENT

Bengt Lydell
ERIN® Engineering and Research, Inc.- USA

There is now extensive experience in the United States with the development of risk-informed alternatives to certain Class 1, 2 and 3 ASME Section XI requirements for the inservice inspection (RI-ISI) of piping. This paper explores the roles of pipe failure data and piping reliability analysis in the development of plant-specific RI-ISI programs. Specifically the paper addresses the role of pipe failure data in the determination of the failure potential of piping segments (degradation mechanism analysis), and risk impact assessments.

LESSONS LEARNED FROM THE ASSESSMENT AND REVIEW OF APPLICATIONS TO USE RI-ISI IN SPANISH NPP

Carlos Castelao, Carlos Mendoza, José M. Figueras
Spanish Nuclear Regulatory Body (CSN)- Spain

Spanish licensees together with the Spanish Regulator (CSN) have performed a pilot study on RI-ISI to analyse the feasibility on the application of this methodology in Spain. The outcome of this pilot project was the issue of a consensus guideline between the licensees and the regulator that describes the way in which the applications must be prepared for its assessment by the regulator. Since then, several partial applications on RI-ISI (Class 1 piping) were presented for approval. This paper describes the results obtained, the actual status of Spanish applications and the lessons learned from the review and assess of these applications.

EXPERIENCE OF RI-ISI APPLICATIONS IN SPANISH NPP's RESULTS AND IMPACT ON ISI PROGRAMS

Juan Bros
Tecnatom, s.a.- Spain
Lorenzo Francia
UNESA- Spain

The in-service inspection (ISI) of nuclear power plant components provides assurance of structural integrity. A revision of ISI scope is currently being considered. The accumulated experience demonstrates that, generally speaking, the inspected areas do not present relevant cracks and that the problems appear in areas outside the scope of in-service inspections. As in other countries, risk informed in-service inspection programs are being applied in Spain in the interests of optimisation.

EXPERIENCE FROM PILOT STUDIES OF RI-ISI APPLICATIONS IN FINLAND. REGULATORY REQUIREMENTS AND INDUSTRY EXPECTATIONS

Kaisa Simola[1], Jouko Mononen[2] & Mikko Tupala[3]
[1]VTT Industrial Systems- Finland
[2]STUK- Finland
[3]Teollisuuden Voima Oy- Finland

Risk-informed in-service inspection methodologies are not yet in use at Finnish nuclear power plants, but two pilot studies have been performed in order to test the applicability and identify resource needs for RI-ISI applications. Insights from the pilot study of the radiation and nuclear safety authority STUK have been utilised in the revision of Finnish regulatory guides, which now require the use of PSA in development of ISI programmes. The pilot study at Olkiluoto unit 1 concluded that inspections could be reduced in many pipelines based on their marginal impact on safety, which would have a positive impact on inspectors' radiation doses and the costs. On-going research activities within the national nuclear safety research programme aim at enhancing the preparedness for RI-ISI implementation in Finland.

RI-ISI CASE STUDY OF OSKARSHAMN 2 IN THE NURBIM PROJECT

Stefan Olsson
OKG AB- Sweden

This paper present results from an RI-ISI case study as a part of the Nurbim project. Piping systems at Oskarshamn unit 2 are calculated with DNV:s code Nurbit.
Nurbit can be used to show reduced risk for core damage and reduced inspection costs.
Nurbit can handle more damage mechanisms than IGSCC but in this BWR-case-study is IGSCC dominating. Different settings of RI-ISI-programs are compared with the reference inspection procedure of the established method of today.
The ideas of the different RI-ISI programs are discussed and the results of the calculations are presented.

SESSION 4

Conclusions on experiences on RI-ISI and needs for further developments
Dr N. Chokshi (NRC-USA)

Panelists: Dr S. Ali, Mr C. Castelao, Mr P. O'Regan, Mr A. Billington, Dr A. Eriksson, Mr L. Skanberg, Dr W. Neumann, Mr C. Faidy

Panel discussions on experiences so far and needs for further developments: criteria for acceptability, etc.

Outcomes are reproduced in the status report *NEA/CSNI/R(2005)3 on " International Developments and Cooperation on Risk-Informed In-Service Inspection (RI-ISI) and Non-Destructive Testing (NDT) Qualification".*

Topic 2 NDT Qualification

SESSION 5

Requirements and experiences on NDT qualification

Dr W. Neumann (HSK- SWT) – Dr C. Birac (EdF-FR)

Contributions:

NDT methods to be qualified, experience of used qualification methodology, difficulties, need for further developments. Regulators or utilities' point of view

OVERVIEW ON PRESENT NDT QUALIFICATION REQUIREMENTS AND PRACTICES

Mr L. Skanberg
SKI- SWD

Contribution on CD-Rom.

THE LINK BETWEEN RI-ISI AND INSPECTION QUALIFICATION

BWO Shepherd
Mitsui Babcock- UK
B Brickstad
SKI- Sweden
MJ Whittle
John Whittle & Associates- UK
OJV Chapman
OJVC Consultancy- UK

This paper discusses the link between risk-informed in-service inspection (RI-ISI), and inspection qualification. It describes the need for a quantitative measure of inspection effectiveness as an input to quantitative RI-ISI, and how a Probability of Detection (POD) curve can provide a suitable metric. The practical problems in generating realistic POD curves are then discussed, and the ENIQ approach to assessing inspection effectiveness is described. The use of simplified "target" POD curves as the basis for qualification is then considered, and the level of detail required in the POD curve is discussed. The availability of data relating signal to noise ratio to POD would facilitate the use of a POD curve as the target for qualification. A possible approach to generating this information is outlined.

HOW TO EXTRACT POD-INFORMATION FROM QUALIFICATION DATA

Dr. B. Brickstad
SKI- SWD

A pilot study has been initiated by SKI to extract POD from existing data used for qualification in Sweden. In this study, a database from SQC was used for UT-01, a procedure for qualification of inspectors for detecting and sizing IGSCC.

US NDT QUALIFICATION EXPERIENCE

Frank Ammirato
EPRI- United States

Qualification of procedures and personnel for nondestructive examination (NDE) of nuclear plant components has been required by US regulations from the beginning of the US commercial nuclear power industry. Accordingly, the responsibility for NDE qualification rests with the plant owner. This requirement, however, is general, and does not give specific requirements or criteria for qualification. In the US, qualification programs for specific components have been developed and are now available to enable the plant owner to comply with this obligation in a uniform way across the industry. For certain ultrasonic examinations required by ASME Section XI, Appendix VIII to Section XI provides specific requirements for demonstrating performance. Plant owners also perform many examinations that are not addressed in ASME Section XI. Qualification for these other examinations, including those for steam generator tubing, reactor pressure vessel head penetrations, and reactor internals, are addressed in other industry-led programs. This paper will outline the various approaches to NDE qualification in the US and describes recent experiences resulting from the application of these qualification approaches.

SPANISH EXPERIENCE ON NDT QUALIFICATION. NUCLEAR INDUSTRY AND REGULATOR VIEWS

Lorenzo Francia (UNESA), Gustavo Bollini (TECNATOM, S.A.),
José M. Figueras (CSN), Carlos Castelao (CSN)

UNESA, as the Spanish Nuclear Association of Utilities, started in 1996 a project to develop the Spanish NDT Methodology based on ENIQ qualification principles within the In-Service Inspection scope of Section XI. This methodology was completed in year 1999 and it was presented to the Consejo de Seguridad Nuclear (CSN, the Spanish Nuclear Regulator) for evaluation and in order to regulate in the near future the ISI qualification approach proposed.

The regulators and the utilities agreed to perform a pilot project to verify the qualification process and the technical requirements defined in the methodology. The pilot project, named VENDE, started in year 2000 and it was ended by the middle of year 2002. The conclusion of the pilot project was that the qualification methodology principles were correct, but some technical subjects had to be revised as a feedback from the project. The revision was completed by UNESA by the middle of year 2003 after several meetings with the Regulators to get the necessary consensus in the modifications. The ISI Qualification Methodology has been then forwarded to the CSN for final approval. This paper presents the experience gained during the elaboration of the Methodology, the pilot project VENDE, the revision process together with the Regulators and the actual ISI qualification activities.

EUROPEAN NDT QUALIFICATION EXPERIENCE

Dr A. Eriksson
JRC- EC

This paper presents:

- ENIQ and it's Achievements in NDT Qualification
- ENIQ Ongoing activities
- Future Development
- Open Issues in NDT Qualifications

Contribution on the CD-Rom.

VVER NDT QUALIFICATION EXPERIENCE

Jiri Zdarek
Nuclear Research Institute Rez plc

A review of NDT qualification projects completed, continued or just only initiated in Czech republic is given in the contribution. NDT qualification projects in the Czech Republic focused predominantly on mechanised ultrasonic or eddy current methods for both VVER 440/213 type NPPs represented by Dukovany NPP and VVER1000/320 type NPP represented by Temelin NPP are described. The first period of implementation of NDT qualification was covered by PHARE projects. Current status and near future of in the NDT qualification in the Czech Republic are highlighted. Lessons learnt, experience received within NDT qualification and NDT qualification benefit achieved for utilities are stressed and summarised. The RPV postulated crack size decreased for the VVER 440 type RPV beltline/core region from 35 to 15 mm within the wall thickness and the prolongation of the RPV inspection interval from 4 to 8 years are regarded as good examples of the NDT qualification impact in the Czech Republic.

FEEDBACK EXPERIENCE OF A FRENCH NDT QUALIFICATION COMMISSION

Dr. Claude Birac, Jean SALIN
EDF – NDT Qualification Commission Chairman and Vice Chairman

Electricité de France has defined a qualification process for NDT applications in accordance with the French regulation and the European standards and rules.

An EDF Commission has been accredited by COFRAC and recognized by the safety authority to pronounce the NDT qualifications.

The process funded on competence and independent Experts participates in increasing the confidence in NDT results.

IAEA ACTIVITIES ON NDT-Q & RI-ISI FOR NPP LIFE CYCLE MANAGEMENT

Mr Cheng
IAEA

Contribution on the CD-Rom

FINAL SESSION: General discussion - Summary and Conclusions
Mr L. Skanberg (SKI- SWD)

Outcomes are reproduced in the status report *NEA/CSNI/R(2005)3 on " International Developments and Cooperation on Risk-Informed In-Service Inspection (RI-ISI) and Non-Destructive Testing (NDT) Qualification".*

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