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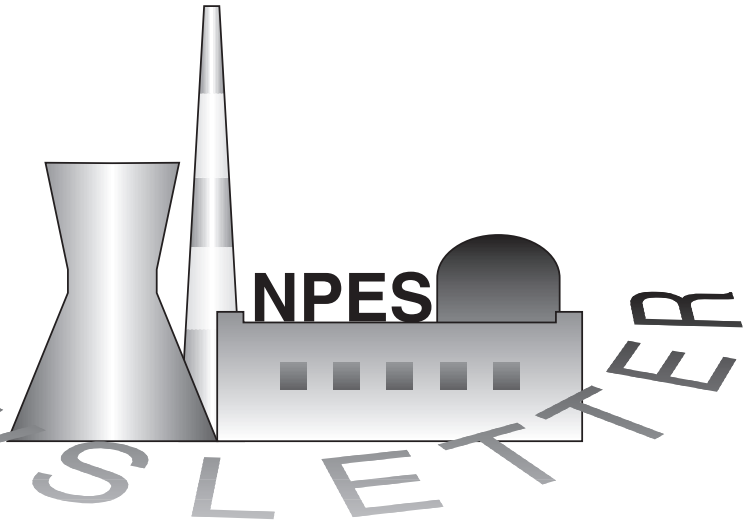

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Main Achievements in 2000

Nuclear Power Programme Planning

Decommissioning costs of WWER-440 nuclear power plants. Objectives of this task are to present decommissioning costs of WWER-440 NPPs in uniform manner (using cost item and cost group system of the Interim technical Document on Nuclear Decommissioning "A Proposed Standardized List of Items for Costing Purposes"), and to provide basis for understanding decommissioning costs differences. Based on the agreement achieved at the Consultants Meeting, November 1999, relevant data from Member States have been collected and analyzed. Preparation of the first draft technical document is under way. *Contact: Mr. P.Trampus.*

A technical report on **Economic Evaluation of Bids for Nuclear power Plants, 1999 Edition** was published. The Guidebook on "Economic Evaluation of Bids for Nuclear Power Plants, 1986 Edition" has been widely distributed to Member States to facilitate economic and financial bid evaluation. During the decade since the Guidebook was last revised, substantial experience and feedback have been gained through use of the Guidebook by Member States. Additionally, the bidding approaches, contracting processes and financing arrangements for nuclear power projects have become greatly diversified, and computer technology and software have undergone significant development. Consequently, the IAEA decided to update both the Guidebook and the computer program.
The updated Guidebook contains state-of-the-art information, advice and recommendations on the different principles, methods and guidelines which should be used and applied in the conduct of an economic evaluation of nuclear power plant bids. The new software, BIDEVAL-3, is based on advanced personal computer technology and is more flexible and user friendly than before.
This Guidebook should be useful to managers, engineers, economists and decision makers of electric utilities and governmental organisations in Member States, particularly in developing countries. The Guidebook should also be helpful to suppliers of plant components and systems by providing a common framework for the preparation of bids.
Contact: Mr. M. Condu

NPP Personnel Training and Qualification

Technical Committee Meeting of the **International Working Group on Training and Qualification of NPP Personnel**- IWG-T&Q) was held from 28-30 March 2000 in Vienna. The meeting summarized and discussed recent developments in the field as well as identifying future directions and anticipated training needs. The IWG-T&Q is a very cost effective way to exchange experience and information that are most important to the Member States in this specialized area. The work of the IWG is very practical, because the results of the IWG-T&Q activities including assessment, analysis and sharing of experience directly support decision making and problem solving at nuclear power plants in Member States.
Contact: Mr. T. Mazour

An IAEA Specialists' Meeting on **Maintaining Needed Capabilities with an Aging Workforce and Declining Educational Infrastructure** was hosted by Teollisuuden Voima Oy (TVO) in Olkiluoto, Finland from 5-8 September 2000**.** This meeting explored the challenges, opportunities and currently available options to address this approaching need for the nuclear industry. In the 1960s and 1970s many of the nuclear power plants now in operation were commissioned. As a result, large numbers of personnel were hired and trained to staff these plants. Today however, many of those people are now approaching retirement age and will need to be replaced in the next 5-10 years. This combined with other social and economic factors such as a more diverse workforce, increased attention on cost reduction, competition of the technology-oriented industries for young scientists and engineers, and reductions in nuclear power educational and training opportunities, present a problem for hiring qualified replacement personnel and transferring to them the knowledge needed to operate and maintain these plants. An important part of this meeting was information provided by the host organization, TVO concerning its ongoing efforts to prepare for transfer of knowledge to the next generation. *The proceedings of this meeting are available upon request from Mr. T. Mazour.*

A technical document on **Analysis Phase of Systematic Approach to Training (SAT) for Nuclear Plant Personnel** (IAEA-TECDOC-1170) was published in August 2000. The purpose of this document is to offer examples of and methods used in the Analysis phase of the Systematic Approach to Training for Nuclear Plant personnel. It is intended that this document will provide useful information for anyone who has chosen to use SAT for the training of their nuclear plant personnel. This TECDOC explains the importance of the Analysis phase of SAT; it describes various methods of job analysis in common use and, in the Appendices, gives examples that have been provided by IAEA Member States. References to other publications relating to the Analysis phase are provided. *Contact: Mr. A. Kossilov.*

Quality Assurance

A technical document on **Quality Assurance Standards: Comparison Between IAEA 50-C/SG-Q**

and ISO 9001:1994 was published as IAEA-TECDOC-1182. The IAEA Safety Standards on Quality Assurance (QA) are mostly used directly or indirectly to establish the nuclear safety requirements at the utility/regulator interface. The industrial ISO 9000 standards are progressively being used to implement the QA requirements at the utility/supplier interface. The interface between both has been growing in significance owing to the impact upon the owners/operators of nuclear facilities and their contractors/suppliers. A clear determination of the technical differences between the IAEA and ISO standards was needed in order to properly comply with the regulatory requirements when ISO standards are applied in nuclear installations. This TECDOC provides guidance on the differences between both standards and supports the practical way of fulfilling nuclear safety requirements. This document was developed with support and development of FORATOM. *Contact: Mr. C. Russell Clark.*

A technical report on **Quality Assurance for Software Important to Safety (IAEA-TRS-397)** was published. Software applications play and increasingly relevant role in nuclear power plant systems. This is particularly true of software important to safety used in both: a) calculations for the design, testing and analysis of nuclear reactor systems (design, engineering and analysis software): and b) monitoring, control and safety functions as an integral part of the reactor systems (monitoring, control and safety system software). Computer technology is advancing at a fast pace offering new possibilities in nuclear reactor design, construction, commissioning, operation, maintenance and decommissioning. These advances are also presenting new issues, which must be considered both by the utility and by the regulatory organization. Refurbishment of aging instrumentation and control systems in nuclear power plants and new safety related application areas have emerged, with direct (e.g., interfaces with safety systems) and indirect (e.g., operator intervention) implication on safety. *Contact: Mr. C. Russell Clark.*

A technical document (IAEA-TECDOC-1169) **Managing Suspect and Counterfeit Items in the Nuclear Industry** was published in August 2000. A suspect item is one in which there is an indication that it may not conform to established specifications or standards. A counterfiet item is a suspect item that is a copy or substitute without legal right or authority to do so or one whose material, performance or characteristics are knowingly misrepresented by the vendor, supplier, distributor or manufacturer. Suspect/counterfeit items (S/CIs) pose immediate and potential threats to the safety of workers, the public and the environment. *Contact: Mr. C. Russell Clark.*

Integrated Management of NPP Operations

Nowadays, when the nuclear power plants have reached a high level of reliability and confidence in their safe performance, it is important to prove that they are competitive in all other aspects: high availability, environment preservation and costs. The element which directly influences availability and costs is the outage duration and its extensions. To address these aspects, a technical document on **Good Practices for Optimisation of Outage Duration** is under preparation. Through self evaluations and case study reports of the industry, the main factors influencing the outage duration and adopted optimisation measures have been identified. The report, presently in the final stage, includes the comments and conclusions of meetings held during 1999 and 2000in which 23 Member States participated.
Contact: Ms. Rejane Spiegelberg-Planer

The IAEA **Nuclear Economic Performance International System - NEPIS,** which aims to achieve the necessary optimisation of economic and technical performance, is now being implemented in about 12 nuclear countries. The data base considers all aspects of economic performance: functional and activity based costing, operational and maintenance (O&M) costs, and safety, economic and operational indicators. The Electric Utility Cost Group (EUCG), USA, works in co-operation with the IAEA to set up the data base. A publication with the results of the work performed at the IAEA to set up the information system was already approved by the Publications Committee and will be soon released in the IAEA Technical Report Series. The report addresses the following issues: 1) major transformations occurring in the electricity generation industry requiring reductions in O&M cost at nuclear utilities; 2) methods for nuclear plant management to identify and justify the economic optimum level and use of resources; 3) value for international community of collecting cost and performance data, and analysis techniques using that data; 4) the cost data that should be collected in order to perform those analyses; 5) difficulty in collecting that data with existing cost accounting systems; 6) suggest new cost accounting and collecting systems; and 7) the cost-effectiveness of the overall process.
Contact: Ms. Rejane Spiegelberg-Planer

The **CRP on Outage Coding System** successfully concluded its work, whose main objective was to develop and implement a standardized and internationally accepted outage coding system for nuclear power plants. The final report is in final preparation by the CRP participants and should be issued in the first quarter of 2001. The results of the work were presented during the Advisory Group Meeting to assess the Power Reactor Information System, its products and publications. The development of a standardized and internationally accepted nuclear

power plant outage coding will satisfy the needs of a broad set of nuclear power plant operators and provide a tool for experience feedback and international benchmarking analysis, to be used in developing guidelines and improvements to nuclear power plant operations.
Contact: Ms. Rejane Spiegelberg-Planer.

The annual publication **Operating Experience with Nuclear Power Stations in Member States in 1999** was issued. The report on the annual operating experience on operating nuclear power plant in the Agency's Member States is a direct output from the Agency's Power Reactor Information System (PRIS), whose database contains all operating experience data published in the Agency's operating experience annual reports since 1971 and basic information on power reactors, including design data.
Contact: Ms. Rejane Spiegelberg-Planer.

The IAEA released the PRIS on CD-ROM, a version on the **Power Reactor Information System (PRIS)** including mapping features and the full database. In addition, PRIS data was also released to the public through the PRIS web page (http://www.iaea.or.at/programmes/a2/) at the end of August 2000. The new PRIS web page provides basic and availability data (performance indicators) of nuclear power plants worldwide and information on all PRIS products and publications.
Currently, the other two PRIS services to the Agency;s Member States, MicroPRIS and PRIS-PC (the connection to PRIS through the Internet) are distributed to more than 600 users in the Agency's Member States and international organizations.
Contact: Ms. Rejane Spiegelberg-Planer.

This second edition of the Country Nuclear Power Profiles published on CD-ROM covers the changes in the new environment in the electricity as well as in the nuclear sector, be it that the situation differs from country to country. In general, the information is updated to 1999.For the preparation of this second edition, the IAEA received contributions from all 31 countries with operating power plants by the end of 1999 as well as Italy and the Islamic Republic of Iran. The document's descriptive and statistical overview of the overall economic, energy, and electricity situation in each country, and its nuclear power framework is intended to serve as an integrated source of key background information about nuclear power programmes in the world.
Contact: Ms. Rejane Spiegelberg-Planer.

IAEA TECDOC-1123: Strategies For Competitive Nuclear Power Plants was published. The objective of this document is to assist the management of NPP organizations in identifying and implementing appropriate measures to remain competitive in a rapidly changing business environment. Restructuring of the electricity business heralds significant changes in nuclear operations. The organization of the entire electric industry will be different as the vertically integrated monopolies that formerly provided electricity are replaced by separate companies, specializing in specific functions. Among them will likely be generating companies including a limited number of highly proficient nuclear operating companies. Producing electricity as a commodity in a competitive market will call for price-driven performance. The safety-focus of nuclear operations is the constant that will carry over into the competitive electricity business. Given the new challenges facing nuclear utilities, there is great need for experiences gained in this environment to be shared among Member States. *Contact: Mr. T. Mazour.*

NPP Life Management

Development of a new module of the **International Database on Life Management of NPPs - International Database on NPP Containment** -was started. The consultants meeting with the aim to develop the Database structure was held providing recommendations for further elaboration of the Database filing structure and its requirements.
Contact: Mr. V. Lyssakov.

Several presentations on the IAEA activities in the area of PLIM were prepared and presented both at IAEA and other International events. At the IAEA SPM and Regional Workshop papers on the IAEA activities in the field of NPP life management were presented.
Contact: Mr. V. Lyssakov.

A specialists meeting on **"Methodology and Supporting Research for Pressurised Thermal Shock Evaluation"** was held in Rockville, United States on 18-20 July 2000.
The purpose of the meeting was to provide an international forum for discussion of recent results from regulatory, operation, and research organizations that address the latest improvements for pressurised thermal shock (PTS) assessments. Reported improvements were relevant to better understanding of PTS phenomena, further development or validation of analysis methods, better understanding of margins against failure, evolving regulatory approaches, or observations from operating experience.
The topics for consideration within these areas included aspects of methodology for PTS evaluation, current practices and future developments, regulatory approaches, approaches to structural integrity assessment including fracture mechanics, PTS screening criteria, thermal hydraulic aspects, selection of transients for PTS risk analysis, investigations of cladding effect, aspects of fracture toughness, chemistry and microstructural factors. The meeting produced a number of recommendations concluding that there was the necessity of integrating PTS analysis results on an interdisciplinary basis – including the major disciplines of probabilistic risk assessment

including risk criteria assessment, thermal hydraulics, and probabilistic fracture mechanics.
Contact: Mr.V.Lyssakov

1st RCM on **Mechanism of Nickel Effect in Radiation Embrittlement of RPV Steels**, 10-12 April 2000, Vienna, Austria

The meeting adopted the work matrix and the scope of the CRP and specified materials distribution.
Contact Mr. V. Lyssakov.

1st RCM on **Surveillance Programmes Results Application to RPV Integrity Assessment**, 19-21 June 2000, Vienna, Austria. The meeting considered time-schedule of the Project and national inputs in accordance with the adopted work matrix and the scope of the CRP and specified testing materials. *Contact: Mr. V. Lyssakov*

The approaches to Plant Life Management in different countries are not necessarily consistent and the overall situation is complex. An optimized and harmonized approach would be desirable. Therefore the work has been carried out during the year on a **Guide on NPP Life Management** aimed to provide Member States with a consolidated approach to PLIM Programmes development. The objective of the technical document is to provide guidance on the approach to policies and the development and implementation of Plant Life Management programmes. The end users will be decision makers on Plant Life Management and those who influence them in NPP utilities, e.g. chief executive officers, plant managers, senior managers in plant design and consulting companies, operating companies and the regulators involved in Plant Life Management. The document will also be a source of useful background information for government, government departments and general public. As a result of planned activities a draft document was prepared and will be under reviewing process till the end of the year. The document is expected to be submitted for publication in 2001. *Scientific Secretary: Mr. V. Lyssakov.*

NPP Control and Instrumentation

Integrated Information Presentation in Control Rooms and Technical Offices at NPP. The overall need for modernization of the information, instrumentation, safety, and control systems in nuclear power plants offers the opportunity to develop and implement new computer systems, networks, and displays that will effectively access and present the full range of information required by all categories of plant staff to assist them in operating the plant efficiently and safely. The technical report completed in October 2000 provides guidance on the approaches to the information integration at NPP and describes best experience of Member States in implementing projects aimed at that goal. The information in the report can also be used to help avoid the pitfalls that can occur when implementing new systems with respect to the information they need and produce. A Specialists Meeting on the subject was organized from 9 to 12 May 2000 in Stockholm, Sweden in order to provide a forum for the discussion of the problem for specialists around the world. The opportunity of the meeting was used to present the IAEA draft report on the subject and to obtain advice from the meeting participants on possible improvements of the report. The papers presented at the specialists meeting were also utilized as an input material for the report.
Scientific Secretary: Mr. Ki-Sig Kang.

A technical document on **Management of Ageing of I&C Equipment in Nuclear Power Plants** was published in June 2000 **as IAEA-TECDOC-1147**. Activities concerning NPP ageing have been in progress at the IAEA over ten years. Work in the field of safety aspects of plant ageing started in 1985 and since then the IAEA has organized a number of meetings in the field of ageing management aimed at exchanging information and documenting experiences, practices, and research. The IAEA has published recommendations on data collection and record keeping for ageing management and a report on the safety aspects of NPP ageing. In 1989, the IAEA initiated work on pilot studies on management of ageing of I&C cables, in 1993, the IAEA organized a specialist meeting on ageing, maintenance, and modernization of I&C systems.
The published report is solely concerned with the ageing management of I&C systems. It draws together experience from various nuclear utilities across the world, examining ageing of specific components and also ageing management techniques. This information is distilled into a suggested ageing management strategy and several practical steps are suggested. I&C ageing management is a developing field and, as yet, there is no one accepted and definitive solution. However, the increasing severity of the problem and on-going work justifies the production of this report, which documents the best current practices. Replacement and upgrading of equipment will form a part of any ageing management strategy.
Based on the I&C ageing research completed to date, four typical I&C components were selected as examples to be discussed in this report. The ageing characteristics of these components are described here and the current practice for their ageing management is identified to illustrate how I&C equipment may age, the consequences of the ageing, and how ageing may be managed by testing of the I&C equipment. The material provided in this report will be useful not only to the nuclear power industry, but also to other power production facilities and industrial processes.
Contact: Mr. Ki-Sig Kang.

Support to Technical Co-operation Activities

INT/4/139:
Interregional Training Course on **Qualification of Nuclear Power Plant Personnel and the Role of Management** held twice in 2000. The first course was conducted in Karlsruhe, Germany from 8-26 May 2000 and the second in Ulsan, Republic of Korea, from 13 November - 1 December 2000. The principal objective of this course is to provide participants with tools that they can use to improve human performance in their organizations. *Technical Officers: Mr. T. Mazour and Mr. A. Kossilov.*

INT/4/040: Interregional Training Course on **Management for Excellence in Nuclear Power Plant Performance.** The course was held at Saclay, France from 19-30 June 2000. The purpose of the course was to transfer experience concerning successful NPP operation in more competitive energy markets in all geographical regions. The main message from this experience was that in order to succeed in these conditions it is necessary to have an integrated approach to management of safety, operations and economics. The course syllabus was developed with close cooperation between the Departments of Nuclear Energy and Nuclear Safety. Emphasis was placed on the practical application of management principles and methods in operating nuclear power plants. As participants were senior managers with considerable experience, this course was not focused on theoretical knowledge, but rather on application of theories to real situations. Lectures were kept to a minimum. Emphasis was placed rather on interactive learning through exercises, demonstrations of facilities and equipment, and discussions. Participants brought with them information about management practices in their organizations. This information was used as the basis for discussions and for practical orientation of lectures/presentations. The participants evaluated the course very positively. They indicated that they had learned a great deal that could be applied to improving their organization's performance, particularly in the more competitive conditions that their plants are now operating in, or are preparing to face.
Technical Officer: Mr. M. Rao.

RLA/4/016:
Two Regional Latin America **Specialist Meetings for Development of Cost Management Systems for Nuclear Power Plants** were held in Brazil and Mexico during 2000. Experts from utilities of Latin American and the Caribbean region participated in the meetings, which were organized jointly by Eletronuclear from Brazil, the Comission Federal de Electricidad from Mexico and the IAEA. The meetings provided a forum for exchange of information and discussions on the assessment of performance of nuclear plants including economic aspects of plant operation and maintenance. The expert group discussed in details the development and implementation of methodology for cost management, collected functional cost data for 1998 and 1999 using the IAEA Nuclear Economic Performance Information System (NEPIS), and initiated benchmarking cost analysis to identify major cost areas. The results of the cost management group would be integrated to the work done in the scope of the same project in the Process Management Group. The Process Management Group proceeds its work to develop a process system catalog based on the system used by Trillo NPP (Spain), which includes the mapping, and prioritizing plant processes. *Technical Officer: Ms. R. Spiegelberg-Planer.*

Reducing Costs in NPP Construction and Operation. The third Executive meeting was held in Havana, Cuba, from 10 to 14 July 2000. The senior managers of the NPPs in the region exchanged information on the current status of nuclear power programmes development in the Latin America region. The special focus was given on the issue on "Management Strategies regarding Competitiveness, Safety, Public Information and Business Plan". Two main facts were highlighted: NPPs with adequate safety levels are also cost efficient in their performance, and safety and efficiency are not the result of a single programme, but the integration of all activities.
The main task of the project is oriented to the NPP Cost and Process Management issues contributing to lowering the production costs of electricity generation and to enhancing public acceptance of nuclear power.
Next, 4th Executive meeting is planned for November 2000 and will be hosted by the NPP Embalse, Argentina. *Technical Officer: Mr. B. Gueorguiev.*

RAS/4/015:
Management Workshop on **Operational and Safety Issues of NPPs** was held in Pusan, Republic of Korea, from 15 to 19 May 2000, hosted by KEPCO. Two new regional project proposals for 2001-04 were introduced. One of them entitled 'Management of Change for Competitive Nuclear Power Performance' will be managed by NPES. The objective of this project is to strengthen capabilities of utility/NPP managers to maximize returns from NPPs through application of international best practices on management for excellence in NPP construction and operation, and through enhanced regional co-operation. *Technical Officer: Mr. P. Trampus.*

RER/4/011:
Regional Workshop on **Impact of Privatization and Market Deregulation on NPP Operation.** This workshop was organized jointly by the IAEA and the Paks Nuclear Power Plant. It was held from 6-10 March 2000 in Paks, Hungary. The principal objective of the workshop was to share lessons learned with respect to NPP operation in more competitive markets, including issues dealing with privatization of operating organizations.
Technical Officer: Mr. T. Mazour.

Regional Training Course on **Strengthening Nuclear Power Project Management** was held in Madrid, Spain, from 3 to 14 April, hosted by CIEMAT and Empresarios Agrupados. Participants from seven European countries were present. The purpose of the course was to provide a good understanding of the scope of nuclear power project management with emphasis on good practices and lessons learned from worldwide experience and related tools and techniques. It was not restricted to new NPP projects but included all major activities at operational NPPs that should be treated as projects for their successful completion. Members States operating NPPs have a permanent and high interest in attending training events dedicated to nuclear power project management with a focus on project management issues at operating plants. *Technical Officer: Mr. P. Trampus.*

Regional Workshop on **Good Practices in National Approaches to NPP Life Management** was held in Ljubljana, Slovenia on 22-26 May 2000.
The purpose of the workshop was to present and exchange experience on the main issues and practical measures related to the development and implementation of NPP Life Management Programmes. The emphasis was made on operational aspects as distinct from safety. The workshop reached a common conclusion that plant life management is the interactive integration of ageing management and economic planning, aiming to optimise plant operation and maintenance and to provide the equipment for the successful operation during the whole plant operation period maintaining the acceptable safety level and at the same time maximising profit from the sale of electricity. *Contact: Mr.V.Lyssakov*

Regional Europe Training Course on **Modernization of Instrumentation and Control in Nuclear Power Plants** was held in Karlsruhe, Germany from October 9 to 27, 2000. The purpose of the course was to transfer the experience concerning the instrumentation and control of nuclear power plants (NPP I&C) of Member States in geographical regions. The course had the fundamental character of experience transfer. Emphasis was placed on the practical application of NPP I&C modernization principles and methods in operating nuclear power plants. During the course participants visited GKN Neckarwestheim NPP, Siemens KWU to see the modernization I&C, KWU Erlangen, to demonstrate the engineering system SPACE tool, Simulator Training Center Essen and Monitoring Station of the plant service & television remote control Karlsruhe.
Technical Officer: Mr. A.Kossilov.

RER/4/020:
Regional Workshop on **In-service Inspection Effectiveness Improvement through Inspection Qualification** was held in Kozloduy, Bulgaria, from 21 to 25 February, hosted by Kozloduy NPP. The interim results of the pilot qualification process were presented, discussed and forthcoming tasks were determined. Most of the recipient countries in Europe follow or decided to follow the IAEA qualification methodology in their own qualification regulation and activity. Assistance through the Pilot Study is, therefore, very important to the Member States.
Technical Officer: Mr. P. Trampus.

Regional Workshop on **Internal and External Inspection of the Reactor Pressure Vessel** was held in Zagreb, Croatia, from 13 to 16 June, hosted by INETEC Institute for Nuclear Technology. There was a thorough analysis and discussion of the status and features of the WWER specific in-service inspection system, which allow to inspect reactor pressure vessels from both internal and external surface. It was concluded that, by establishing complementary systems for inside and outside inspections of the reactor pressure vessels in WWER plants with appropriate performance level and maximum coverage of areas to be inspected, the in-service inspection strategy could be optimized.
Technical Officer: Mr. P. Trampus.

Regional Workshop on **Evaluation of NDT Results for Remaining Lifetime Assessment** was held in Brno, Czech Republic, from 26 to 30 June, hosted by Dukovany NPP and the Training and Education Center of CEZ. Key issues on remaining lifetime assessment as well as technical feasibility of operating nuclear power units beyond their design lifetime were thoroughly discussed. All WWER operating countries in Europe region have strong intention to operate their plants beyond the lifetime considered by the designer. Life management strategies and systematically organized actions, however, supporting this intention are not always technically sound and timely prepared. The importance of the topic underlines need for continuation of the dialog with WWER operating countries in this area.
Technical Officer: Mr. P. Trampus.

Activities in 2000

Nuclear Power Programme Planning

A technical document on "**Cost drivers for the assessment of NPP life extension**" is under preparation. The objective of this technical document is two-fold:

(i) To provide an understanding of the various cost elements and drivers in NPP life extension.

(ii) To present cost data collected through a questionnaire sent to IAEA Member States and to discuss and identify the basis of the available cost estimates of different activities. This will allow users to draw their own conclusions for input into the economic assessment.

The document addresses the following issues: 1) major transformations occurring in the electricity sector leading to increased competition. 2) the process to decide on PLEX, focusing on a systematic approach of estimating its costs. 3) the national and regulatory approaches on NPP PLEX in countries answering the questionnaire. 4) PLEX cost data reported. The costed PLEX scope is presented for each of the NPPs reported. In addition for all reported reactors tables show the cost ranges. 5) discussion of the results

The first draft of the document was reviewed in an AGM held in September 2000. A second draft of the document will be reviewed in a consultancy meeting planned in December this year. The document will be completed in 2001. *Scientific Secretary Mr. M. Condu*

NPP Personnel Training and Qualification

A technical document on **Training Programmes for NPP Personnel that make Effective Use of Less Than Full-scope NPP Control Room Simulators**. The overall objective of this task is to develop a technical document that can be used by NPP and utility managers and trainers to improve the use of less than full scope simulators in the training of their personnel. Through this technical document, lessons learned and good practice information with respect to integration of less than full-scope control room simulators into NPP personnel training programmes will be collected, organized and disseminated. The document should provide specific examples of training plans and exercise guides that make effective use of less than full scope simulators. *Scientific Secretaries: Mr. T. Mazour and Mr. A. Kossilov*.

A technical document on **The Effectiveness of SAT-based Training for NPP Personnel** will provide information to utility and NPP managers and other industry organizations on the effectiveness of SAT-based training for NPP personnel. The primary objective of the document is to help training professionals to define the inputs and outputs of their training systems, to learn when evaluations are to be conducted, what techniques are to be utilized, what data should be collected and when, as well as to identify key personnel who should be involved in the process. It is expected that the document will also include national/utilities' experience (case studies) in training effectiveness evaluation as well as cost-benefit analysis of nuclear training, and recommendations on improving of training effectiveness. In order to obtain examples of methods to identify and improve the effectiveness of training, the **Survey on NPP Personnel Training Effectiveness** has been designed and distributed to Member States. The material obtained through this Survey will be analyzed by the group and presented in the document as an integrated part corresponding to national/utilities' experience in training effectiveness evaluation. A consultants' meeting was held in May 2000 in Knoxville, USA.

Scientific Secretary: Mr. A. Kossilov.

A Co-ordinated Research Programme (CRP) on **Information Management Solutions for SAT Applications (SAT-IM)** was launched in 1999 as a part of the IAEA activities on NPP training and qualification. This CRP is to realistically address the pressing need of Member States of the IAEA to compile lessons learned, and to develop guidance for Member States in the area of maintaining and upgrading the management information contained in their SAT (Systematic Approach to Training) programmes. The focus of the project is to take advantage of the capabilities available in computer based information management systems in order to improve operational efficiency and increase safety performance. Up to now seven counties have submitted the proposals to joint the project. The first research coordinated meeting was held at Paks NPP, Hungary.

Scientific Secretary: Mr. A. Kossilov.

A technical document on **Assuring the Competence of NPP Contractor Personnel** will be prepared in 2000. As mentioned in a number of IAEA documents, contractor personnel provide many essential services to nuclear utilities and individual NPPs during planned outages, for refueling, for major upgrade projects, for specialized maintenance, and for routine non-nuclear services, such as security, administrative support, facilities management, buildings maintenance and catering. A continuing issue of great importance with respect to contractor personnel is how to ensure, in a cost-effective way, that they are competent or appropriately qualified to perform their assigned tasks. Some utilities are finding innovative solutions to this

common need. The new technical document will offer assistance to utility and NPP managers and other organizations in the form of a framework for assuring the competence of NPP contractor personnel. The primary objective of the document is to help plant management and training professionals to identify the required technical and professional competence of contractor personnel, and to offer methods and tools for its assessment and evaluation. The document will also include examples of national/utilities' experiences (case studies) in the subject area. Two meetings are planned to be held on the subject in 2000.
Scientific Secretary: Mr. A. Kossilov.

Preparation of a technical document on **a Systematic Approach to Human Performance Improvement: Emphasis on Training Solutions.** There has been considerable focus on the technical competencies related to a nuclear power plant and its processes that are needed by NPP personnel, particularly plant operations staff. However, to ensure that NPPs achieve the high standards with respect to safety, operational performance and economic competitiveness needed in today's environment, it has been recognized that there are other competency areas that are also important, including:

- open communication
- teamwork
- leadership
- situational awareness
- problem resolution
- safety conscious focus
- business focus, and
- professionalism.

These competencies are referred to in some Member States as "soft skills" and in others as "human factor-related competencies."
This document will describe a systematic approach to achieving high standards of human performance through integrating training of NPP personnel in all of the competency areas identified above, with other aspects that influence human performance such as plant procedure systems, work control systems, supervision and oversight, personnel selection, and information management. From 20-23 March 2000, a consultants meeting was held in Vienna to resolve comments received on the initial draft of this document. The document has been submitted for publication and is expected to be available in late 2000 or early 2001. *For additional information, please contact Mr. T. Mazour.*

Integrated Management of NPP Operations

The main goal of this Co-ordinated Research Project (CRP) **National Approaches to Correlate Nuclear Power Plant Performance Targets and O&M Budget** is to analyze national approaches to correlate performance targets and O&M costs with the objective to identify major economic performance indicators. This activity is part of an integrated approach to economic and performance analysis of nuclear power plants. It includes the development of economic performance indicators to allow the management to identify more clearly where and how costs are being incurred and to determine whether adjustments would improve plant competitiveness. Eleven countries participate in this project. The second Research Co-ordinated Meeting is planned to be held from 6 to 10 November 2000 to analyse data collection for 1998 and 1999, develop a formal benchmarking process for application by member countries; discuss conversion methodology to be used in conjunction with the NEPIS database and identify performance and cost indicators to correlate with cost. All interested Member States are invited to participate in this project. *Scientific Secretary: Ms. Rejane Spiegelberg-Planer.*

Participants from twenty-five countries attended the Advisory Group Meeting to assess developments on PRIS, its products and publications held from 9 to 12 October at the IAEA Headquarters in Vienna. The participants, Liaison-officers for PRIS in their countries, provided recommendations to the Agency on improvements in the system based on needs of data providers and users of PRIS. The subjects discussed in the meeting covered: data acquisition and retrieval systems, publications, data collection and performance indicators.
Scientific Secretary: Ms. Rejane Spiegelberg-Planer.

In preparation of an Internet Forum to discuss Methodology of Inventory Management, a meeting is planned to be held from 13 to 15 November 2000 to discuss with a few operators from the IAEA Member States to discuss the dissemination of methodologies for inventory management in nuclear power plants in the Internet, to enable better sharing of resources throughout the nuclear operators. start-up of this activity. For nuclear power plant optimisation, the outage management is an important issue. For the management, it is essential to get available on time and at optimum cost the needed spare parts for nuclear generation facilities. Ready available spare parts contribute largely to the plant safe and economic. *Scientific Secretary: Ms. Rejane Spiegelberg-Planer.*

Preparation of a technical document on **the Use of Risk Management to Improve the Cost Effectiveness of NPP Operation.** Significant progress has been made in the development and implementation of risk-based technology for nuclear power plant applications in a number of Member States. These applications have included in-service inspection, in-service testing, technical specifications, and other activities related to regulatory requirements and safety. However, it is now

clear that there are equally important uses of risk-based technology outside of the regulatory environment, related to needs of plant owners such as improving the cost-effectiveness and efficiency of the plants. They include: on-line maintenance, graded quality assurance, reliability-centered maintenance, and evaluation of potential plant upgrades and modifications. This work is being co-ordinated with our colleagues in the Nuclear Safety Department who are working on the use of PSA for nuclear safety applications. From 10-13 April 2000, an Advisory Group Meeting (AGM) was held to review the initial draft document. From 4-7 July 2000, a consultants meeting was held to resolve comments received during and subsequent to the AGM. The document has been submitted for publication and is expected to be available in early 2001.
Scientific Secretary: T. Mazour.

Preparation of a technical document on **Management of Organizational Change in Nuclear Utilities** is in progress. Political and economical changes in countries which operate and /or are presently constructing nuclear power plants are increasingly pressing the utilities to ensure that the construction and operational costs of those plants be competitive with alternative electricity production technologies, while complying with the nuclear industry's standards with respect to operational safety and environmental protection. Management of nuclear utilities are therefore facing significant challenges in the current fast developing and competitive energy environment. The nuclear utility's management teams need to learn, share and develop managerial measures to optimise the use of available resources while adhering strictly to regulatory compliance. A final AGM and Consultancy meeting is planned for December 4-8, 2000 to prepare a completed document to be submitted for publication. *For additional information, please contact Mr. C. Russell Clark.*

NPP Configuration Management Throughout Plant Life-Time. The purpose of this technical document is to define the various aspects that need to be considered in the development and implementation of a configuration management system. These aspects include design, procurement, methods/tools, human factors, cost/benefit, and implementation. In addition, examples are included from various countries, which have implemented such systems. The lessons learned during this implementation are reviewed. *Scientific Secretaries: Mr. V. Kotyza and Mr. A. Kossilov.*

NPP Control and Instrumentation

Information Technology Impact on the Design Process and Plant Documentation. The general objective of the task is to provide through an IAEA publication (TECDOC series) the recommendations and guidance on how the modern computer technologies can be utilized in the design process and plant documentation to improve configuration management at NPP, reliability of data, quality of personnel work and through these to improve plant operational performance and safety. The scope of the planned technical document will cover at least the following topics: design process for new plants; the impact on documentation maintenance in the existing plants; how to keep documentation on-line with the plant; electronic diagrams; changes induced by CAD tools; applications to old plants, how to maintain documentation, scanning paper copies; bar codes on the equipment; economic aspects of putting documents in the electronic form (in any case the life-time of paper documentation is less than 30-40 years, so there should be ways to maintain documentation and the computerization of documentation seems the most reasonable solution also for existing plants); intelligent features of scanning of drawings.
Scientific Secretary: Mr. Ki-Sig Kang.

Co-ordinated Research Programme (CRP) on **Scientific Basis and Engineering Solutions for Cost Effective Assessments of Software Based I&C Systems.** The main goal of the CRP is to collect information and perform analysis of the efficiency of the assessment process for operating computer-based I&C systems, to suggest engineering solutions in software-based I&C systems which provide for a cost effective assessment process, and to develop a systematic approach to the development of software-based systems ensuring cost-effective assessment process. The first meeting of the participants of this CRP was held in Vienna, Austria at the IAEA Headquarters on November 8-12, 1999. The participants at this meeting represented the following countries and organizations: Argentina - Nucleoelectrica Argentina S.A., Czech Republic - I&C Energo, Finland - VTT, Norway - OECD Halden Reactor Project, Republic of Korea - KAERI, Russia - VNIIAES, Ukraine - SSTCNRS, and United States of America - EPRI. The participants gave presentations on the work they propose to perform as part of the CRP. Based on this information, the objectives and activities of the CRP were identified. The participants worked together to develop an outline for the final technical report, which will describe the results of the CRP at the end of its three-year period of performance. The next meeting is planned to be held at the OECD Halden Project in Norway on December 4-8, 2000.
Scientific Secretary: Mr. Ki-Sig Kang.

NPP Life Management

Consultants Meeting to prepare the scope and work matrix for a new IAEA co-ordinated research project on **Evaluation of radiation damage of reactor pressure vessel using the IAEA Database on RPV materials** will be convened from 12 to 14 December 2000, in Vienna, at the IAEA Headquarters. The scope of the CRP will address the problem of the RPV integrity

assessment and reliable calculations of its remaining irradiation lifetime. *Contact: Mr. V. Lyssakov.*

Advisory Group Meeting on Decommissioning Costs of WWER-440 Nuclear Power Plants. IAEA Headquarters, Vienna, 20-23 November 2000. The goal of the meeting is to discuss the first draft of the technical document with special regard to the cost calculation data prepared by the Member States and submitted to the IAEA. Another goal of the meeting is to discuss and decide about the possibility of extending the scope of the task to use a cost estimation model (computer code) for a joint cost estimation study for WWER-440 plants. *Contact: Mr. P. Trampus*

Support to Technical Co-operation Activities

RER/4/011:
1) Joint IAEA-FORATOM Workshop on **Integrated Management Systems of Nuclear Installations**, 24-27 October 2000, Ljubliana, Slovenia. The objective of the Workshop is to provide a forum for exchanging experience on integrated management issues related to common difficulties, possible solutions and good practices directed to improve NPPs' overall performance.
Technical Officer: Mr. B. Gueorguiev.
2) October 24 - 27, 2000 will be the annual workshop shared between the IAEA/FORATOM organizations in Ljubljana, Slovenia for FORATOM members and participants from western and Eastern Europe. The objective of the workshop is to provide a forum for exchange of experiences on **Integrated Management Systems of Nuclear Installations** related to common difficulties, possible solutions and good practices directed to improve NPP's overall performance with regard to safety. The workshop is directed at senior and middle management of nuclear facilities, suppliers and technical support organizations. The workshop is evidence of a developed partnership between the IAEA and the FORATOM organization. *Contact: C. Russell Clark.*
3) A workshop to provide a forum to discuss issues pertaining to **Managing the Early Termination of NPP Operations** is being held and hosted in Griefswald, Germany December 12-16, 2000. Over the last decade many changes have occurred in the electric industry within the Member States. The demand resulting from these many changes has initiated many nuclear power generators to reassess their operation of nuclear power plants faced with increased competition from other sources of generation. Under a work plan with the Technical Co-operation Department it was agreed to prepare a workshop on this topic to provide a forum for discussion pertaining to the issues raised by early shutdown decisions. It is hoped that the participants will exchange experiences and share strategies and techniques that can be used by NPP and operating managers to manage plant operations after a decision is made for early termination of NPP operations. *For information pertaining to this subject, Contact: Mr. C. Russell Clark, Mr. T. Mazour or Mr. B. Hansson*

RLA/4/016:
Regional Workshop on **On Line Testing of Nuclear Power Plant Temperature and Pressure Instrumentation and other Critical Plant Equipment**, December 4-8, 2000, Laguna Verde, Mexico. *Technical Officer: Mr. A. Kossilov.*

RER/4/020:
Regional Workshop on **Steam Generator Tube Integrity** will be held in Kalinin, Russian Federation, 27 November - 1 December. The goal of the workshop is to familiarize participants with and to exchange experiences on WWER steam generator heat exchanger tube integrity assessment, degradation processes, in-service inspection methodology and NDT techniques.
Technical Officer: Mr. P. Trampus.

Plans for 2001

Nuclear Power Programme Planning

Guidance on Integrated Approach to Nuclear Power Programme Planning. A number of activities related to integrated approach to nuclear power programme planning are being developed to give guidance for the developing Member States wishing to embark on a nuclear power programme. As recommended by the Consultants' Meeting 11-15 October 1999, the Agency is going to revisit and update previous guidebooks to make them compatible with the new framework in the power supply sector. As a first step, it will be identified the elements that characterize the new environment (such as: planning strategies, privatisation, nuclear & non-nuclear regulatory interfaces, financing approaches, environmental issues) in order to define the areas which need updating. A high level document with this new framework for power and nuclear power planning will be developed. The experts will identify also the elements that need further detailed analysis. Two meetings are planned on the subject in 2001. *Scientific Secretaries Mr. M. Rao and Mr. M. Condu*

Quality Assurance

Comparison of IAEA and ISO 9001:2000 Standard. Develop a TECDOC to proceed to the next level of comparison by taking the ISO 9001:2000 Series, when

issued and completing a comparison similar to the ISO 9001:1994 project. At the consultants meeting in 1999 it was agreed to proceed with the comparison/linkage between the IAEA 50-C/SG-Q and ISO 9001:1994 on the grounds that several years would be needed before the next version ISO-9001:2000 is adopted and effectively implemented. Hopefully, the new ISO standard will be issued early in 2001 and a work plan can be developed to proceed with the new comparison. *For comment and/or information, please contact Mr. C. Russell Clark.*

Quality Requirements in Decommissioning Nuclear Power Plants. Prepare a technical report on management measures to ensure fulfilment of quality and business requirements in decommissioning of NPPs. As the nuclear industry ages and competition forces the shutdown of NPPs , decommissioning will become a priority concern within the industry. It is important to establish a programme of Quality Assurance standards and requirements during this phase. Guidance for NPPs facing decommissioning will be an important factor to ensure a safe and effective process. Through this technical document, lessons learned and good practice information from NPPs already experienced in developing QA Programmes for decommissioned sites will be utilized and provided. The technical report is scheduled to be available in 2002. *Scientific Secretaries: Mr. C. R. Clark and Mr. B. Gueorguiev.*

NPP Personnel Training and Qualification

Develop a technical document on **Effective Use of NPP Control Room Simulators**. The overall objective of this task is to develop a technical document that can be used by NPP and utility managers and trainers to improve the use of NPP control room simulators in the training of their personnel. Through this technical document, lessons learned and good practice information with respect to integration of control room simulators into NPP personnel training programmes will be collected, organized and disseminated. This document will address the full spectrum of control room simulators that are currently being used in the industry: full-scope plant-referenced simulators, multifunctional simulators, analytical simulators, and desktop, part task simulators. The document should provide specific examples of training plans and exercise guides for control room simulator training. An Advisory Group Meeting is planned to review an initial draft document in Vienna from 9-11 October 2000. The technical document is planned to be available in 2002. *Scientific Secretaries: Mr. T. Mazour and Mr. A. Kossilov*.

Develop a technical document on **Human Resource Management (HRM).** The objective of HRM is to ensure that the organization maintains adequate numbers of competent and motivated personnel to achieve the organization's mission. This issue is particularly critical in a period when the nuclear industry is becoming less attractive for young people, and as many of the staff of existing NPPs approach retirement age. Among the topics planned to be included in this document are:

1. establishment and maintenance of a formal human resources policy
2. personnel performance assessment
3. career development
4. establishing and maintaining a positive work environment
5. partnerships with educational and training organizations
6. use of job rotation
7. preservation of knowledge important to anorganization's continued success
8. supervising outsourced activities

In April 2001 the Agency plans to hold a consultants meeting to assist it in developing an initial draft document on this topic. The document is expected to be available in 2002. *Scientific Secretary: Mr. T. Mazour*

Provide an Internet forum for exchange of information related to training and qualification of NPP personnel. In 1999 the IAEA published IAEA-TECDOC-1063, IAEA World Survey of NPP Personnel Training. While this information was found to be useful to Member States, by its nature some of it was out of date before it was published. It is intended that this internet forum would not only provide a mechanism to maintain information such as that found in IAEA-TECDOC-1063 up-to-date, but also other useful information such as:

- A calendar of IAEA training related events
- Access to related publications of the IAEA
- Links to other related web sites

Contact Mr. T. Mazour or Mr. A. Kossilov for further information.

Integrated Management of NPP Operations

To continue improving the features made available in the Country Nuclear Power Profiles and enable better sharing of resources throughout the nuclear power plant operators, the Agency will open a forum for discussion and dissemination of **Methodologies for Inventory Management in nuclear power plants** in the Internet. Inventory management is one of the key issues to consider in the optimisation of nuclear power plant safety and economic performance. Inventory management can be done at the plant, utility level or regional level. Some utilities have developed pooled inventory management programmes for pooling of emergency spare parts for nuclear power plants. Others have

developed programmes to procure and store emergency spare parts, which represent major costs in nuclear power plant maintenance. Usually, the emergency spare parts are generally large motors, pumps, and rotating stock, which can be either safety or non safety-related. *Scientific Secretary: Ms. R. Spiegelberg-Planer.*

The main objective of **the Power Reactor Information System** project is to foster continuous improvements in the operating performance of nuclear power plants through assessment and dissemination of utilities experience and practices by collection, assessment and dissemination of information on the operating performance of nuclear power plants and analysis of subject areas affecting plant performance. In 2001, PRIS will continue to distribute its products to the Member States - MicroPRIS, PRIS-PC and PRIS on CD-ROM, and through its Internet page at http://www.iaea.or.at/programmes/a2/. Further, an Internet Forum for exchange of information among PRIS liaison officers should be provided and developed by the Agency in 2001.
Additional data on performance indicators should be included in PRIS and broader the scope of PRIS with the development of new tables to collect data on the use of nuclear power plants for non-electrical applications and on decommissioning of nuclear power plants. *Scientific Secretary: Ms. R. Spiegelberg-Planer.*

Implementation of the **Nuclear Economic Performance Information System (NEPIS)** worldwide will continue in 2001 with the main activities being followed and implemented through an Internet Forum using the IAEA Virtual Office Business Collaborator. *Scientific-Secretary: Ms. R. Spiegelberg-Planer.*

Continuing its efforts to provide an integrated source of key background information about nuclear power programmes descriptive and statistical overview of the overall economic, energy, and electricity situation in each country, and its nuclear power framework, the **Country Nuclear Power Profiles** is planned to be updated in 2001. The annual updates published in CD-ROM should cover the changes in the nuclear sector and update the statistical data on energy and economic situation as well as on the status and trends of nuclear power.
Scientific Secretary: Ms. R. Spiegelberg-Planer.

NPP Control and Instrumentation

Biennial meeting of the International Working Group on Control and Instrumentation of Nuclear Power Plants (IWG-NPPCI), May 2001, Vienna, Austria. The meeting will address recent national results in implementation of NPP Control and instrumentation programmes and international events. The meeting will identify and initiate the activities enabling to make the best use of the available and emerging technologies to meet the plant operational and safety needs in an economic manner. The IWG will also review terms of reference and scope of activities in accordance with the MSs demands. The target users of this information are R&D organizations, designers and decision makers. *Scientific Secretary: Ki-Sig Kang*

Specialists Meeting **on Effective Management of NPP I&C Modernization Projects** is planned to be organized in Garching, Germany on 26-29 September 2001. The demands for modernization to the existing I&C systems in NPPs are increasing to enhance safety and improve availability and reduce the operation and maintenance costs. However, modernization of I&C system brings with several challenges. The meeting will consider the determination of which systems to modernize, what technology to use, how to implement new systems so that it will work together with older systems in a different technology.
Scientific Secretary, Mr. Ki-Sig Kang

Internet forum for exchange of experience on the impact modern technology on NPP I&C systems.
Modern I&C technologies on NPP I&C systems offer significant opportunities to improve the access and presentation of information to the user. This internet forum would not only provide a mechanism to exchange new information such as modernization experience, cost/benefit analysis and modern information, but also other useful information such as:

- A calendar of modern I&C guideline
- Access to related publications of the I&C techmnology events
- Links to other related web sites

Contact Mr. Ki-Sig Kang for more information.

NPP Life Management

Specialists' Meeting on **Irradiation Effects and Mitigation** is planned to be organized in Gloucester, United Kingdom on 14-17 May 2001. The main objective of the meeting is to exchange information on recent results, research and utility experience in radiation damage of RPV steels, surveillance programmes and topics of annealing and re-embrittlement with the aim to provide guidance and recommendations for further optimisation of surveillance and annealing programmes as well as directions for future studies in the subject area. *Contact: Mr. V. Lyssakov .*

Second Research Co-ordination Meeting (RCM) on **Mechanism of Nickel Effect in Radiation Embrittlement of RPV Steels** is planned to be held in Sazopol, Bulgaria from 26 to 29 of May 2001.
The meeting will consider and co-ordinate first results of material testing mostly for non-irradiated specimens.
Scientific Secretary: Mr.V.Lyssakov.

Second Research Co-ordination Meeting on **Surveillance Programmes Result Application to Reactor Pressure Vessel Integrity Assessment** is planned to be held in Prague, Czech Republic, from 12 to 14 September 2001. The meeting will consider and co-ordinate first results of material testing, some results from studies of material properties at micro-structural level and future activities in accordance with the existing work matrix for both irradiated and non-irradiated specimens. *Scientific Secretary: Mr. V. Lyssakov.*

First Research Co-ordination Meeting on **Verification of WWER steam generator tube integrity** is planned to be held at IAEA Headquarters, Vienna, from 20 to 23 March 2001. The meeting will serve to discuss the inspection scope and methods which will basically cover comparison of non-destructive (eddy current) testing results with destructive (mechanical, microstructural, microanalytical) testing results on the same steam generator tube samples with special attention to operational history data.
Scientific Secretary: Mr. P. Trampus

Biennial meeting of the **International Working Group on Life management of Nuclear Power Plants** (IWG-LMNPP), 20-22 February 2001, Vienna, Austria
The meeting will address recent national results in implementation of NPP life management programmes and international events in this area and based on this information to elaborate a forward programme for the biannual period under the specified list of priorities. The IWG will also review its terms of reference and scope of activities in accordance with the MSs demands. The target users of this information are R&D organizations, designers and decision makers. *Scientific Secretary: Mr. V. Lyssakov.*

SPM on **"Master Curve Testing and Results Application",** 17-19 September 2001, Prague, Czech Republic *(Mr. V. Lyssakov)*
The objective is to provide international forum for information exchange on the recent results in applications of the Master Curve approach in RPV integrity assessment including use of small size surveillance specimens and multi-temperature approach. The meeting will review and discuss recent results in RPV material testing by the use of the Master Curve approach and results application to surveillance programmes and RPV integrity assessment.
The target users of this information are R&D organizations, designers, engineers and regulatory authorities involved in the RPV integrity assessment.

SPM on **"Risk informed aspects on NPP life management - emphasis on integrity of primary circuit components",** III-IV quarter 2001, venue to be defined. The objective is to provide international forum for information exchange on the recent results in applications of reliability based structural integrity analysis with the emphasis on key component integrity using the experience from inspection and operation statistics. The meeting will review and discuss recent results in NPP components structural integrity assessment using probabilistic methods of assessment based on inspection and operating experiences.
The target users of this information are R&D organizations, designers and engineers and regulatory authorities involved in the RPV integrity assessment.
(Mr. V. Lyssakov)

SPM on **Optimization of NPP maintenance programme** will be held in Charlotte, NC, USA, 19-22 June 2001. An increasing tendency can be identified in moving from the preventive maintenance concept to one dependent on plant and component condition. Component selection for condition based maintenance, parameter selection for monitoring condition, evaluation of condition monitoring results are issues influencing the effectiveness of condition based maintenance. Also reliability-centered maintenance using component reliability profile is a step in the optimisation. An other method is of assigning maintenance priorities is introducing risk informed in-service inspection of pressurized components. Integrating long-term activities such as major refurbishment or main component replacement to the plant outage strategy, and outage management play also significant role in the optimization process.
The purpose of the meeting is to provide international forum for exchanging information to identify maintenance optimization methods and techniques (engineering and managerial) and evaluate how maintenance optimization contribute to long term and reliable plant operation.
Contact: Mr. P. Trampus

The work on the development of the **International Database on NPP Containment** will continue in 2001. Two consultants meeting will be held during the year with the aim to finalise Database structure and filing system and to provide the requirements for database developers. *(Mr. V. Lyssakov)*

Develop a technical document on **Effects of Neutron Irradiation in RPV Weldments and Steels**. The overall objective is to revisit and update earlier IAEA publication with similar title with the purpose of providing the state of the art publication on the recent investigations and methodologies in monitoring and ameliorating technologies for irradiation embrittlement as well as provide the most modern approaches to the understanding of irradiation damage mechanisms.
Two consultants meetings are planned to review initial draft document in Vienna during the year. The technical document is planned to be available in 2002.
Scientific Secretary: Mr. V. Lyssakov

Support to Technical Co-operation Activities

Preliminary list of TC projects to be implemented in 2001-02 and supported by NPES:

Regional East Asia and the Pacific:
Management of changes for competitive nuclear power performance *(TO: Mr. P. Trampus)*

Regional Europe:
Improving primary circuit component integrity *(TO: Mr. P. Trampus)*
Optimisation of NPP performance and service life *(TO: Mr. B. Gueorguiev)*
Modernization of Instrumentation and Control for NPP*(TO: Mr. Ki-Sig. Kang)*
Optimisation of Nuclear Power Plant Maintenance *(TO: Mr. P. Trampus)*

Regional Latin America:
Reducing costs in NPP construction and operation *(TO: Mr. B. Gueorguiev)*

Armenia:
Strengthening ISI activity in Armenia through application of modern NDT methods *(TO: Mr. P. Trampus)*

Bangladesh:
Rooppur nuclear power project *(TO: Mr. M. Rao)*

Brazil:
Monitoring and diagnostics of nuclear reactors *(TO: Mr. P. Trampus)*
Modernisation and optimisation of control room and support systems trough the implementation of a human-system interface laboratory *(TO: Mr. A. Kossilov)*
Systematic Approach to Training (SAT) implementation for Angra Power Plant *(TO: Mr. T. Mazour)*
Structural integrity analysis of nuclear reactor components *(TO: Mr. V. Lyssakov)*

Bulgaria:
Re-training of personnel involved in decommissioning of Kozloduy NPP *(TO: Mr. T. Mazour)*
Upgrading RPV surveillance programme for Kozloduy NPP *(TO: Mr. V. Lyssakov)*
Planning and management of decommissioning of Kozloduy NPP units 1 & 2 *(TO: Mr. P. Trampus)*
Development of WWER-440 full scope replica control room simulator for Kozloduy NPP *(TO: Mr. A. Kossilov)*

Czech Republic:
Evaluation of radiation damage attenuation in WWER reactor pressure vessel and core internals *(TO: Mr. V. Lyssakov)*
System for automatic collection and evaluation of experimental data in NPP *(TO: Mr. A. Kossilov)*

Egypt:
Manpower development for project preparation and project management *(TO: Mr. M. Rao)*
Establishing a QA Program for the Egyptian NPPA *(TO: Mr. C. Russell Clark)*

Indonesia:
Support for the first nuclear power plant *(TO: Mr. T. Mazour)*

Islamic Republic of Iran:
Strengthening owner's function for BNPP project *(TO: Mr. M. Rao)*

Mexico:
Modelling of radiation induced degradation in reactors *(TO: Mr. V. Lyssakov)*
Structural integrity program of reactor pressure vessel and internals from Laguna Verde Nuclear Power Station *(TO: Mr. V. Lyssakov)*

Morocco:
Technical assistance with a view to drawing up a contract with the constructor of the Sidi Boulbra nuclear power plant *(TO: Mr. M. Condu)*

Republic of Korea:
Upgrading technical capabilities of nuclear power training in Korea *(TO: Mr. P. Trampus)*

Romania:
Technical support for the improvement of Cernavoda unit 1 operation management *(TO: Mr. B. Gueorguiev)*
Improving capabilities for predictive maintenance for some important components of Cernavoda NPP *(TO: Mr. A. Kossilov)*

Russian Federation:
Fracture toughness of WWER pressure vessel materials *(TO: Mr. P. Trampus)*

Turkey:
Public understanding of nuclear energy *(TO: Mr. M. Rao)*
Establishment of materials testing and characterisation laboratory *(TO: Mr. P. Trampus)*

Ukraine:
In-service inspection of WWER-1000 steam generators *(TO: Mr. P. Trampus)*
Support for decommissioning of Chernobyl NPP *(TO: Mr. P. Trampus)*

Recent Publications

1997

IAEA-TECDOC-919: ***Management of Procurement Activities in a Nuclear Installation*****,** January 1997

IAEA-TECDOC-922: ***Performance Analysis of WWER-440/230 Nuclear Power Plants*****,** January 1997

IAEA-TECDOC-928: ***Good Practices for Cost Effective Maintenance of Nuclear Power Plants***, February 1997

RDS-2/17: ***Nuclear Power Reactors in the World*** (April 1997 edition*)*

IAEA-TECDOC-952: ***Advanced Control Systems to Improve Nuclear Power Plant Reliability and efficiency,*** July 1997

STI/PUB/1051: ***Operating Experience with Nuclear Power Stations in Member States in 1996***

1998

IAEA-TECDOC-995: ***Selection , Specification, Design and Use of Various Nuclear Power Plant Training Simulators*****,** January 1998

IAEA-TECDOC-1016: ***Modernization of Instrumentation and Control in Nuclear Power Plants,*** May 1998

IAEA-TECDOC-1024: ***Selection, Competency Development and Assessment of Nuclear Power Plant Managers***, June 1998

STI/PUB/1050: ***Choosing the Nuclear Power Option: Factors to be Considered***

RDS-2/18: ***Nuclear Power Reactors in the World (April 1998 edition)***

Country Nuclear Power Profiles, March 1998

STI/PUB/1070: ***Operating Experience with Nuclear Power Stations in Member States in 1997***

IAEA-TECDOC-1052: ***Nuclear Power Plant Organization and Staffing for Improved Performance: Lessons Learned,*** November 1998

IAEA-TECDOC-1057: ***Experience in the Use of Systematic Approach to Training (SAT) for Nuclear Power Plant Personnel,*** December 1998

IAEA-TECDOC-1058: ***Good Practices with Respect to the Development and Use of Nuclear Power Plant Procedures***, December 1998

Safety Report Series No. 6: ***Safety Issues for Advanced Protection, Control and Human-Machine Interface Systems in Operating Nuclear Power Plants***, 1998 (prepared jointly with NSNI)

1999

IAEA-TECDOC-1063: ***IAEA World Survey on Nuclear Power Plant Personnel Training,*** January 1999

IAEA-TECDOC-1066: ***Specification of Requirements for Upgrades Using Digital Instrument and Control Systems,*** January 1999

IAEA-TECDOC-1078: ***Technical Support for Nuclear Power Operations,*** April 1999

RDS-2/19: ***Nuclear Power Reactors in the World*** *(April 1999 edition)*

IAEA-TRS-384: ***Verification and Validation of Software Related to Nuclear Power Plant Instrumentation and Control,*** 1999

IAEA-TRS-387: ***Modern Instrumentation and Control for Nuclear Power Plants, A Guide Book,*** 1999

STI/PUB/1087: ***Operating Experience with Nuclear Power Stations in Member States in 1998***

IAEA-TECDOC-1090: ***Quality Assurance within Regulatory Bodies,*** June 1999

IAEA-TECDOC-1095: ***The Impact of the Year 2000 Issue on Electricity Grid Performance and Nuclear Power Plant Operation in Bulgaria, the Russian Federation and Slovakia,*** June 1999

IAEA-TECDOC-1098: ***Evaluating and Improving Nuclear Power Plant Performance,*** July 1999

IAEA-TECDOC-1110: ***Management of Delayed Nuclear Power Plant Projects***, September 1999

EUR-18718: NDT ***Methods for Monitoring Degradation. Proceedings of Joint EC/IAEA Specialists' Meeting, Petten, The Netherlands, 10-12 March 1999***

IAEA-TECDOC-1123: ***Strategies for Competitive Nuclear Power Plants***, November 1999

2000

Human-Machine Interface for Off Normal and Emergency Situations in Nuclear Power Plants. Proceedings of IAEA Specialists Meeting, Taejon, Korea, 26-28 October 1999, **KAERI/TR-1456/2000, IAEA-J4-SP-1123,** 2000

IAEA-TRS-397: ***Quality Assurance for Software Important to Safety,*** 2000

RDS-2/20: ***Nuclear Power Reactors in the World*** *(April 2000 edition)*

IAEA-TECDOC-1140: ***Effective Handling of Software Anomalies in Computer Based Systems at Nuclear Power Plants****,* March 2000

IAEA-TRS-396*: Economic Evaluation of Bids for Nuclear Power Plants, 1999 Edition,* April 2000

IAEA-TECDOC-1147: ***Management of Ageing of I&C Equipment in Nuclear Power Plants***, June 2000

IAEA-TECDOC-1170*: Analysis Phase of Systematic Approach to Training (SAT) for Nuclear Plant Personnel***,** August 2000

IAEA-TECDOC-1182*: Quality Assurance Standards Comparison Between IAEA 50-C/SG-Q and ISO 9001:1994,* 2000

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