IAEA-EBP-LTO-09
290404

EXTRABUDGETARY PROGRAMME ON SAFETY ASPECTS OF LONG TERM OPERATION OF WATER MODERATED REACTORS

MINUTES OF THE PROGRAMME'S SECOND STEERING COMMITTEE MEETING

16-18 March 2004

INTERNATIONAL ATOMIC ENERGY AGENCY

1. INTRODUCTION

The number of Member States giving high priority to extending the operation of nuclear power plants beyond their initial license is increasing. Decisions on long term operation (LTO) involve the consideration of a number of factors. While many of these decisions concern economic viability, all are grounded in the premise of maintaining plant safety. The IAEA recognized this new industry initiative; therefore, in the 1990's, it developed comprehensive generic guidance on how to manage the safety aspects of physical ageing. It was recognized, however, that internationally agreed-upon, comprehensive guidance was needed to assist regulators and operators in dealing with the unique challenges associated with the LTO issue.

In response, the IAEA initiated this Extrabudgetary Programme (Programme) on 'Safety aspects of long term operation of water moderated reactors' (original title was 'Safety aspects of long term operation of pressurized water reactors'). The Programme's objective is to establish recommendations on the scope and content of activities to ensure safe long term operation of water moderated reactors. The Programme should assist regulators and operators of water moderated reactors, and, in particular WWERs, in ensuring that the required safety level of their plants is maintained during long term operation, should provide generic tools to support the identification of safety criteria and practices at the national level applicable to LTO, and should provide a forum in which MS can freely exchange information..

The Programme activities are guided by the Programme Steering Committee (SC), follow the overall SC Programme Workplan and SC Terms of Reference, [1], and are implemented in 4 Working Groups (WG). The WGs focus on:

- general LTO framework (WG 1);
- mechanical components and materials (WG 2);
- electrical components and I&C (WG 3);
- structures and structural components (WG 4).

Further detailed information on the Programme could be found at: http://www-ns.iaea.org/nusafe/s_projects/salto_int.htm .

The purpose of the second Steering Committee Meeting, held at the IAEA Headquarters in Vienna, Austria, 16-18 March 2004, was to review the progress of the Programme. Specifically, the Steering Committee reviewed the Workplans, Standard Review Process, and the schedule developed and presented by the four Working Groups.

The Agenda for the Meeting is provided in Appendix I. Minor adjustments were made to the Agenda to accommodate presentation times.

The Meeting was attended by nominated representatives of the participating Member States (MS), observers from the European Commission, and WG leaders/secretaries, Appendix II. Copies of the presentation materials are provided in Appendix III. Following the 2nd SC meeting, a short co-ordination meeting of WG leaders/secretaries took place on 18 March.

2. MEETING SUMMARY

Mr. Ken Brockman, Director of the Division of Nuclear Installation Safety (NSNI) of the IAEA, opened the Meeting. In his opening comments Mr. Brockman complemented all the member states for the quality of participants on the SC and on all of the WGs. He stated that the LTO related work is one of the key areas in the NSNI future activities, it is planned to incorporate the activities of this Programme into the Agency's regular budget programme during 2006 and that he is hoping to continue receiving advice from a group like this committee also in the future. He also stated that he was pleased with the progress to date and urged continued diligence to maintain the good progress.

Mr. Radim Havel, the Programme Scientific Secretary, summarized the Programme activities that have taken place since the first Steering Committee Meeting in May 2003.

- In August 2003 the Working Group Leaders and Secretaries met to draft the Workplans (IAEA EBP-LTO-02) and the Standard Review Process (IAEA-EBP-LTO-03).
- Based on the successful first draft of these two documents the second SC Meeting, tentatively scheduled for December 2003 was postponed until 16-18 March, 2004.
- The four WGs met and finalized the Workplans and the Standard Review Process and developed a schedule for the rest of their activities.

Mr. Havel also praised the excellent experts that are participating in the WGs. He also mentioned that the WG participants have a great deal of work to do over the next two years and urged the SC Members to provide support and coordination for the WG participants (from their MS). He also introduced a new member of the SC, Mr. Bill West of the United Kingdom. Mr. Havel mentioned that he continues discussing with Japan, Korea and Germany and is hopeful that there will be additional participants before the next Steering Committee Meeting.

Mr. Havel brought up an item raised by many of the WG participants for later discussion during the SC meeting, relative to the scope of the Programme. Many WG participants wondered why the Programme was being restricted to PWRs, many felt that at least BWRs should be included and possibly others reactor types.

As a final note Mr. Havel stated that Ms. Ziakova, the representative from Slovak Republic was unable to attend, but that Slovak Republic continues to support the Programme and in addition to the cost free experts who participate in the Programme activities, will also provide some financial support.

Mr. Frank Gillespie, the SC Chairman, welcomed the participants. In his opening remarks, he expressed concern, that there were many different activities within the Agency and within many of the MS participating in this Programme relating to LTO and emphasized the need to coordinate all these activities to avoid duplication and to take maximum advantage of all the work conducted. Mr. Gillespie stated that the support and participation in the Working Groups was excellent and that the support and participation on the SC was outstanding. He urged all to continue this level of coordination and support.

Mr. Gillespie then asked the SC to consider changing the title of the project to recognize the interest of several current Member States and potential participants. The question centered

on not excluding BWR and CANDU reactor operating experience from the scope of the programme. He asked the SC to consider a change in the Programme title.

2.1. NATIONAL PRESENTATIONS

Each MS participating in the SCM made a brief presentation, describing the status of its efforts with regard to the LTO and its continued support to this Programme. These presentations are included as Appendix IV.

Bulgaria

Short summary of the licensing conditions of KNPP units 1-6:
Units 1&2 shut down on Dec.31st 2002 and brought into status 'E'(no fuel rods in reactor core) in conformity of the Technical Specifications and in 2004 Operation Licenses were issued for the next 5 years.
Units 3&4 since 2003 under Operation Licenses for 8 and 10 years respectively, till the end of the design lifetime. According to the newly established Safe Use of Nuclear Energy Act the maximum licensing period of a nuclear facility is 10 years. Units' requalification into Model 209M and updated SARs were presented to Bulgarian Nuclear Regulatory Agency as a basis for the issuance of the operational licenses. The specific Licensing conditions include completion of the Complex Modernization Programme within 2003 and the Plant Long Term Programme on specific subjects for further improvement of the units safety level till 2009.
Units 5&6 under Operation Licenses issued 2003 for the next 6 years, till the completion of the Modernization Programme of the units. The programme includes design oriented measures, analysis and additional research, replacement of equipment under expiry and critical importance, improvement of plant operating conditions and covers a total number of 204 measures.

Bulgaria supports the intention to expand the Programme to other plant types and thus engage more countries, exchange more experience, involve more specialists in defining the conditions, technical features and general international standards for optimal extension of NPP operation. It is necessary that next SCM reviews and approves the contents of the expected Programme final report.

Czech Republic

Mr. Krs provided the following comments:

- The project has quite ambitious work plan – it may happen that participants will not be able to cover all items on the work plan list in full
- Program of WG 4 shall be modified to bring it more close (scope, depth, working method) to other three WGs
- Information already provided by participants during the first WGs meetings create sufficient basis for concise summary on existing legislation in participating MS – no more time and effort in this direction is needed
- Rest of the activities under SALTO shall be concentrated mainly on “technical work”, resp. gathering and/or exchange of relevant technical information. As a basis for these activities a part of the Standard License Renewal Application Format may be used (of course with clear assignment to individual WGs - see enclosure)
- To enable smooth continuation of already initiated work in WG’s a clear and unambiguous guidance on content and structure of the national reports shall be provided
- The Czech Republic continues to support the Programme and in addition to the in-kind contribution (cost free experts), will also provide financial support.

Finland
Mr. Koponen described the Finnish approach to licensing and lifetime management of nuclear power plants. In 1998, the operation of the Finnish nuclear power plants Loviisa 1 and 2 and Olkiluoto 1 and 2 plants units, were re-licensed. The operating licenses of Loviisa 1 and 2 units are valid till the end of 2007, and for Olkiluoto 1 and 2 till the end of 2018, but periodic safety review has to be carried out by the end of 2008. According to the Finnish regulations, safety enhancements have to be done based on operational experiences, safety research and advancement of science and technology. Future challenges were also presented, such as modernization of I&C systems at both plants. Mr. Koponen believed that this EBP will provide useful information to all countries where long term operation of nuclear power plants are considered

Hungary
In his presentation, Lajos Vörösss reported on the activities being made for recovery of the service shaft, which contains the cleaning tank with the damaged fuel elements and on the preparatory work for restart of the intact but contaminated Unit 2 of Paks NPP. He stressed that in spite of the severe INES-3 incident occurred on 10th April 2003 the intension of lifetime extension and power uprating is still insisted on.

Russia
Mr. Dragunov and Mr. Adamchik described the Russian approach to design life time extension of WWER reactors, including regulatory basis and criteria. Concept of WWER-440 (V-179) safety improvement at Novovoronezh NPP (Units 3&4) was also presented. Technical solutions on safety systems upgrading implemented at Novovoronezh NPP were described. As a result of the upgrading performed, Units 3&4 has been brought to the acceptable safety level according to the requirements of up-to date standards (redundancy, independency, single failure, protection against common course failure). There are no deviations from the current regulatory requirements of 3rd and 4th safety categories (as to IAEA classification). The impact of upgrading on the probability of the core damage was demonstrated. Russian Federation continues to support the Programme.

Sweden
Mr. L.G. Larsson stated that the Swedish understanding of the LTO is a continuous process of safety enhancement, which is based on operational experiences and development of science and technology. The issue is much broader than plant life extension, which is more connected to license renewal, and limited by its time frame depends on type of the license and validity. Swedish situation was described shortly with example of Oskarshamn 1, which was presented more in detail at the previous SCM. The Swedish presentation was focused on the SALTO programme progress so far. It was proposed for consideration to involve more countries having long operational experience and by this to have a better data platform. A general comment as an impression from the first Working Group meetings is that more space should be given to basic data collection in comparison to relatively long time planned for editing of the reports. Sweden continues to support the Programme as the expected results are of interest for both nuclear industry and regulatory authority. Finally, it was confirmed that Sweden would host the next WG 1 meeting in Stockholm, August 2004. The meeting will be followed by WG 1 study-visit to Oskarshamn NPP and its modernized Unit 1.

Ukraine
The National Nuclear Energy Generating Company ENERGOATOM (Operator) in co-operation with the State Nuclear Regulatory Committee of Ukraine (Regulator) have already started developing the set of normative and procedural documentation to prepare nuclear power plants (units) for the service life extension (their long term operation).

Since 2004, activities have been planned intended for pilot units, which are related to the equipment inspection and the ageing management programme implementation. Moreover, the work schedules have been developed. Pursuant to the Governmental decision, the 'Comprehensive Programme on Modernization and Safety Improvement of the NPP units in Ukraine' is being implemented that will ensure the NPP unit safety level increase meeting advanced modern requirements.
Ukraine supports the IAEA' s Extrabudgetary Programme on the 'Safety aspects of long term operation' and suggests the title of the final document of the Programme be agreed upon to ensure more effective and optimum efforts of the Working Groups while collecting and summarizing the information.

UK
Mr West stated that the UK had an ageing reactor population and had already had a developed Long Term operation Programme that was based on the Periodic Safety Review. Although most of the reactors in the UK are gas-cooled, many of the issue associated with long term operation are common with water cooled reactors. UK will continue to support the Programme.

USA
The United States continues to believe that for long-term operations the similarities between water moderated reactors in different countries far outweigh the differences. Once the unique systems are reduced to components and then materials, safety function and environment the management and monitoring of time related degradation is common to all plants. Therefore, the lessons learned from operating experience in day to day operations, as manifested in aging management and monitoring programs on which this program focuses enhances each countries ability to detect and mitigate degradation before compromising a safety function. The United States continues to strongly support this unique effort to bring together in one organized and structured program the optimum approaches on to managing and monitoring the effects of plant aging.

EC
The European Commission, following the indications of the 1992 G7 Summit in Munich considers that the soviet designed reactors of the first generation should be shut down as soon as practically possible, i.e. in the case of pressurized water reactors of the VVER 440-230 type, the EC does not support life extension. In this sense, the EC has negotiated with the new Member States, setting up closure dates for the Ignalina NPP in Lithuania, the Bohunice V1 plant in Slovakia and Kozloduy 1-4 in Bulgaria.
The EC has been also negotiating with Armenia in order to find an agreement on a closure date for the Medzamor NPP stating its readiness to support Armenia in finding secure, sufficient, diversified, alternative power supplies.
Notwithstanding, the EC is highly interested in the assistance to regulators and operators of other VVER reactor types to ensure that the required safety level of their plants is maintained during long term operation. In particular, in the last Tacis Nuclear Safety Indicative Programme, 2004-2006 it is proposed to assist the Russian Federation and Ukraine in the lifetime management for second and third generation reactors.
The EC Joint Research Center (JRC) develops R&D projects supporting the safe operation of Nuclear Power Plants. The JRC is engaged in plant management studies of ageing nuclear installations and in improving safety assessment methods for critical damage mechanisms. Topics covered apply to both eastern and western reactor designs. Via EC-JRC networks such AMES, NESC, ENIQ and SENUF operated within the project called SAFELIFE, areas addressed range from the assessment of reactor pressure vessels, advanced irradiation studies, thermal fatigue, risk-informed inspection procedures, and optimization of maintenance procedures.

EC-JRC also provides technical and scientific expertise in all areas of the PHARE and TACIS nuclear safety programmes devoted to the safety improvement of operating nuclear power plants of second and third generation in CEEC and CIS.
Web links to EC-JRC networks from the SALTO web site should be of interest with regards to the dissemination of EC-R&D and TACIS & PHARE project results concerning safe operation of ageing nuclear power plants.

Following the MS presentations, overview of related IAEA activities, carried out in the frame of regular budget and TC Projects, was provided by the IAEA staff, Appendix IV.

Mr. Gillespie summarized the questions and concerns that were raised during the discussions:

- Several SC members expressed concern regarding the amount of information that the WG needed to collect the level of detail needed for the country inputs
- There were several questions regarding the effort necessary to review all the information gathered

Mr. Koponen reiterated that LTO is a rather broad subject and that there is a need to ensure that all important LTO related issues are addressed by the Programme within the four WGs.

Mr. West proposed that the SC should define the end product, the final report of the Programme. This will provide better direction and guidance to the WGs and hopefully address many of the questions raised earlier during the discussions.

2.2. WORKING GROUP PRESENTATIONS

Each of the Working Groups provided a brief overview of their activities thus far and their plans for future activities. The major activities for the four WG were the finalization of the Workplans (IAEA-EBP-LTO-02) and the Standard Review Process (IAEA-EBP-LTO-03)

Working Group 1 – PT Kuo (WG 1 Chairman)

Mr. Kuo briefly reviewed the activities for Working Group 1, which is focused on the General LTO Framework. The group's first meeting was held 13-15 January 2004 in Vienna and the minutes are provided in IAEA-EBP-LTO-04. During that meeting the WG reviewed and finalized the Workplan and the Standard Review Process for WG-1. Mr. Kuo informed the SC that the group discussed in detail the level of detail that the members needed to collect in accordance with the Workplan. Mr. Kuo also briefly discussed the schedule for WG 1 activities. Mr. Kuo's presentation is included in Appendix IV.

Working Group 2 – V. Piminov (WG 2 Chairman)

Mr. Piminov reviewed briefly the activities for Working Group 2, which is focused on Mechanical Components and Materials. The group's first meeting was held 4-6 February 2004 in Vienna and the minutes are provided in IAEA-EBP-LTO-05. During that meeting the WG reviewed and finalized the Workplan and the Standard Review Process for WG 2. Mr. Piminov discussed the modifications that the group made to the Workplan and the Standard Review Process in order to specify the type and scope of information that each member should collect for the group's review. Mr. Piminov also discussed briefly the schedule of activities for WG 2. Mr. Piminov's presentation is included in Appendix IV.

Working Group 3 – R. Moffitt (WG 3 Secretary)

Mr. Moffitt did not have a formal presentation as the other Group Leaders provided, so he just briefly reviewed the activities to date for WG 3. The focus for WG 3 is Electrical Components and Instrumentation and Controls (E&IC). The first meeting for WG 3 was held 10-12 February 2004 in Vienna and the meeting minutes are provided in IAEA-EBP-LTO-05. Unfortunately not all the representatives were able to attend the first meeting; Russia and Hungary were unable to attend. Similar to the other groups, WG 3 members reviewed and finalized the Workplan and the Standard Review Process for WG 3. In addition the WG 3 members developed a schedule for their future activities. Similar to the other groups there was considerable discussion during the meeting relative to the scope of the information to be collected and reviewed. WG 3 decided to have a second WG meeting fairly early on during the information collection phase to help standardize the collection process and make sure there is no confusion among the WG members. The next WG 3 meeting is tentatively scheduled for late May in Kyiv Ukraine.

Working Group 4 – W. Burton (WG 4 Secretary)

Mr. Burton briefly reviewed the activities for Working Group 4 which is focused on Structures and Structural Components. The group's first meeting was held 3-5 March 2004 in Vienna and the meeting minutes are provided in IAEA-EBP-LTO-07. During that meeting the WG reviewed and finalized the Workplan and the Standard Review Process for WG 4. Mr. Burton discussed the key revisions that the group made to the Workplan and the Standard Review Process to better describe the scope of activities for WG 4. Mr. Burton also briefly discussed the schedule for WG 4 activities and some concerns that WG 4 desired some additional guidance from the Steering Committee:

- Design basis information
- Configuration management
- Expanded scope of the Programme
- Working Group co-ordination
- Programme website

Mr. Burton's presentation is included in Appendix IV.

2.3. DISCUSSION

Following the four WG presentations there was a general discussion regarding the information provided by the WGs. Specific topics of discussion:

- Design basis – it was agreed that design basis is not a part of this Programme other than as a means of identifying the SSCs that should be included in the scope.
- Configuration management – it was agreed that configuration management was part of the process for making sure that aging management programmes are kept current with the plant design and operation. This is an item that should be covered within WG-1.
- Programme website – Mr. Havel provided a brief overview of the proposed IAEA website and how the Programme information can be integrated into the website and accessed by the Programme participants.
- Scope and content of information to be reviewed – there was still considerable discussion and concern regarding the level of detail that the WG members were going to be collecting and reviewing. Including the process for determining the adequacy of programmes that the various MS use to address aging management. The general conclusions for those topics are included below:

Process or Criteria for Identifying Components that have an Adequate Aging Management Programme:

To ensure that existing plant programmes (e.g. maintenance programme) can adequately manage the identified ageing effects, a set of attributes of an acceptable ageing management programme will be established. The existing plant programmes should be evaluated against these attributes (e.g. detection of ageing effects, trending, acceptance criteria and operation experience) to determine their acceptability. Any new ageing management programmes to be developed should also satisfy these attributes to be acceptable.

Scope of Information to be Collected and Reviewed:

Throughout the meeting there was considerable discussion on the topic of the information each MS is being asked to provide to the working groups, specifically with respect to the level of detail for this information. It was noted by the WG leaders that this item was also a major topic of discussion for all four of the Working Groups. It was recommended that additional guidance be provided to better ensure consistency between the different MS and among all the WGs.

As discussed during the meeting, the information that each MS is being asked to provide is not intended to be an all inclusive data gathering exercise. Rather the expectation is that the information will be a "road map" that describes the regulatory criteria and practices being used by the MS. The information should include references to the various laws, regulatory criteria and guidance, standards, research, etc. that are applicable to LTO and therefore form the basis for the criteria and practices being used. It is recognized that not all MS have complete programmes and that many MS are still at the very early stages of addressing LTO and therefore do not have fully developed programmes in place yet.

However, several member states reported that regulatory requirements for LTO already exist. These may be an integral part of nuclear law or less formal guidance documents, developed generally on a plant specific basis. The requirements may include objectives as well as providing assurance to licensees that the regulator will agree to LTO if the requirements are met. It was agreed that where such requirements exist, they would form a good basis for the countries' inputs to each WG.

It was also pointed out during these discussions that the information the MS are providing to the WGs is intended primarily for use within the WG as a means of determining the common elements and differences, and the reasons for those differences, between the various MS programmes. This information will be used to develop the recommendations for the WG reports. The intent is that the WG Final Reports along with the Programme Final Report will be country independent, focusing only on the recommended criteria and practices. It was agreed that the countries' inputs provided by the WG members would be included as attachments to the WG Final Reports.

Mr. Adamchik proposed, that it is important that the Programme Final Report addresses the following issues related to LTO:

- what is to be assessed, priorities;
- procedures available;
- effectiveness of procedures;
- comparison of procedures;
- recommendations on procedures.

The WG leaders/secretaries confirmed, that WGs are planning to work in this direction.

There was a general discussion among the SC members relative to the scope of the Programme and whether or not the Programme name should be revised. There was general agreement that the scope should be expanded beyond PWR's. The SC agreed to revise the title of the Programme as follows: *Safety Aspects of Long Term Operation of Water Moderated Reactors*. This title will be used on Programme reports, web pages etc. beginning with the issuance of the IAEA-EBP-LTO-03.

It was also agreed that the title of the Programme Final Report will be *Recommendations on the Scope and Content of Programmes for Safe Long Term Operation of Water Moderated Reactors*, and that it will consist of introductory part, inputs by each WG based on the WG Final Reports summary, and overall conclusions and recommendations.

The Steering Committee then provided some specific comments and revisions to the Workplans and the Standard Review Process and with those minor modifications these two documents were approved. The final Standard Review Process will be issued as the report IAEA-EBP-LTO-03, the set of final Workplans for all 4 WGs as IAEA-EBP-LTO-08.

3. ACTION ITEMS

1. The WG leaders and secretaries will develop a Table of Contents / Outline of countries' inputs and provide it to R.Havel by 26 March 2004
2. The WG leaders and secretaries will develop a Table of Contents / Outline of WG final reports and provide it to R.Havel by 26 March 2004
3. The WG leaders and secretaries and R.Havel will develop a Table of Contents / Outline of the Programme Final Report submit it along with above items 1 and 2 (after circulating it for comments to all WG participants) to the SC for review by 8 April 2004.
4. After SC approval, the Tables of Contents will be incorporated in the IAEA-EBP-LTO-03, R.Havel, 15 April 2004.
5. Develop Programme open web pages, R.Havel, 6 April 2004.
6. Develop Programme password protected web pages, R.Havel, dd mmmm 2004.
7. Mr. T Taylor (WG-2) and Mr. R Moffitt (WG-3) will prepare a sample outline of the country input by March 31, 2004.
8. Explore the need to convene WG leaders/secretaries co-ordination meeting in the second half of 2004. R.Havel, 31 July 2004.

The next Steering Committee Meeting is tentatively scheduled for January 25-27, 2005.

REFERENCES

[1] Minutes of the Programme's 1st Steering Committee Meeting, IAEA-EBP-LTO-01, Vienna, 2003 (internal EBP report).

[2] Minutes of the Programme's Planning Meeting, IAEA-EBP-LTO-02, Vienna, 2003 (internal EBP report).

[3] Standard review process, IAEA-EBP-LTO-03 Vienna, 2004 (internal EBP report).

[4] Minutes of the Programme's Working Group 1 First Meeting, IAEA-EBP-LTO-04, Vienna, 2004 (internal EBP report).

[5] Minutes of the Programme's Working Group 2 First Meeting, IAEA-EBP-LTO-05, Vienna, 2004 (internal EBP report).

[6] Minutes of the Programme's Working Group 3 First Meeting, IAEA-EBP-LTO-06, Vienna, 2004 (internal EBP report).

[7] Minutes of the Programme's Working Group 4 First Meeting, IAEA-EBP-LTO-07, Vienna, 2004 (internal EBP report).
[8] Programme's Working Groups Workplans, IAEA-EBP-LTO-08, Vienna, 2004 (internal EBP report).

APPENDIX I.
AGENDA
2nd Steering Committee Meeting
Provisional Agenda

Tuesday, 16 March 2004		
9:30	Opening	Mr.K.Brockman
	EBP status and meeting objective	Mr.R.Havel
	Chairman's address	Mr.F.Gillespie
	Countries' statements	
10:30	Bulgaria	Ms.R.Tranteeva
10:45	Czech Republic	Mr.P.Krs
11:00	*Coffee break*	
11:30	Finland	Mr.H.Koponen
11:45	Hungary	Mr.L.Voross
12:00	Russia	Mr.S.Adamchik
12:30	*Lunch break*	
14:00	Sweden	Mr.L-G.Larsson
14:15	Ukraine	Mr.O.Semenov
14:30	UK	Mr.B.West
14:45	USA	Mr.W.Burton
15:00	EC	Messrs.I.Lopez Arcos, M.Bieth
15:20	*Coffee break*	
	IAEA related activities	
15:50	Design basis documentation (RER/9/069)	Ms.C.Toth
16:10	NE PLIM and I&C activities (incl. RER/4/025)	Mr.K-S.Kang
16:30	NE structural integrity activities (incl. RER/4/024)	Mr.H.Cheng
16:50	National TC Projects HUN/4/014 and ARM/9/012	Ms.C.Toth, Mr.A.Atger
17:00	NS LTO activities and National TC Project UKR/4/013	Mr.T.Saito
17:20	NS knowledge base on AM and LTO	Mr.T.Inagaki
17:40	National TC Projects RUS/9/002	Mr.A.Toth
17:50	National TC Projects RUS/9/003	Mr.R.Havel
18:00	*Adjourn & Reception-VIC Restaurant*	
Wednesday, 17 March 2004		
9:00	WG 1	Mr.P-T.Kuo
9:45	WG 2	Mr.V.Piminov
10:30	*Coffee break*	
11:00	WG 3	Mr.B.Moffitt
11:45	WG 4	Mr.W.Burton
12:30	*Lunch break*	
14:00	Discussion	Mr.F.Gillespie
15:30	*Coffee break*	
16:00	Review and approval of IAEA-EBP-LTO-04, 05, 06, and 07	WG leaders
16:45	Review and approval of IAEA-EBP-LTO-02 and 03	WG leaders
17:30	*Adjourn*	
Thursday, 18 March 2004		
9:30	Discussion	Mr.F.Gillespie
11:00	*Coffee break*	
11:30	Conclusions	Mr.F.Gillespie
12:00	Final remarks	Mr.F.Gillespie
12:30	*Adjourn*	

WG leaders/secretaries co-ordination meeting
Provisional Agenda

Thursday, 18 March 2004		
14:00	WG leaders discussion on interface issues among WGs	
15:30	*Coffee break*	
16:00	WG leaders discussion on co-ordination needs among WGs	
17:30	*Adjourn*	

APPENDIX II.
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Mr. Takeyuki Inagaki	NSNI-ESS
Ms. Csilla Toth	NSNI-ESS
Mr. Huiping Cheng	NENP-NPES
Mr. Ki Sig Kang	NENP-NPES
Ms. Vesselina Ranguelova	NSNI-SAS

APPENDIX III.
PRESENTATIONS

IAEA EBP
on
SAFETY ASPECTS OF LONG TERM OPERATION OF PRESSURIZED WATER REACTORS

2nd Steering Committee Meeting

IAEA, Vienna, 16-18 March 2004

Radim Havel

EBP STATUS

- Planning Meeting
  - August 2003
  - WG leaders and secretaries
  - Draft WGs Workplans (IAEA-EBP-LTO-02); approved by SC
  - SRP need (IAEA-EBP-LTO-03)
- WGs kick-off meetings (January-March 2004):
  - Finalize IAEA-EBP-LTO-02 and 3
  - Minutes: IAEA-EBP-LTO-04 through 07
- WGs:
  - Excellent experts
  - Schedule agreed upon
  - Substantial commitments/workload
  - Open issues (scope, co-ordination needs, etc.-WG l/s present.)

EBP STATUS cont'd

- SC new members:
  - UK
  - Germany
- Discussion with Japan, Korea, …
- SALTO PWR…do we need the P? …water cooled reactors
- WG leaders/secretaries co-ordination mtg.
- EBP funding - limitations

2nd SC MEETING OBJECTIVE

- Discuss and approve:
  - Workplans (IAEA-EBP-LTO-02) incl. overall EBP schedule
  - SRP (IAEA-EBP-LTO-03)
  - WG minutes (IAEA-EBP-LTO-04 through 07)
  - EBP www presentation proposal
- Advise on:
  - EBP implementation
  - Co-ordination (leverage, closed loop)
- Next SC meetings:
  - proposal - EBP schedule
  - consider inputs/needs/outcomes
- Support and co-ordinate national efforts

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SECOND STEERING COMMITTEE MEETING

16-18 MARCH 2004

VIENNA, IAEA

RADELINA TRANTEEVA

DEPARTMENT OF SAFETY

KOZLODUY NPP

2

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OPERATIONAL STATUS OF KOZLODUY NPP

Unit	Reactor type	Start of operation	Current fuel cycle	Expected end 30th fuel cycle
Unit 1	WWER-440/V230	Oct.1974	2002/23	-
Unit 2	WWER-440/V230	Nov.1975	2002/24	-
Unit 3	WWER-440/V230*	Dec.1980	18	2015
Unit 4	WWER-440/V230*	Jun.1982	17	2016
Unit 5	WWER-1000/V320	Nov.1987	9	2024
Unit 6	WWER-1000/V320	May 1991	8	2025

*Units 3&4 originally improved design with safety systems equal to V 213

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UNITS 1&2 LICENSING CONDITIONS

On a decision of the Government of the Republic of Bulgaria units 1&2 were shutdown on Dec.31st 2002 and brought into status 'E' (no fuel rods in reactor core) in conformity of the Technical Specifications.

In January 2004 Bulgarian Nuclear Regulatory Agency issued to KNNP an Operation License in statue 'E' for Unit 2 for the next 5 years.

In February 2004 Bulgarian Nuclear Regulatory Agency issued to KNNP an Operation License in status 'E' for Unit 1 for the next 5 years.

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UNITS 3&4 LICENSING CONDITIONS

In May 2003 Bulgarian Nuclear Regulatory Agency issued to KNNP the Operation License for Unit 3 for the next 8 years.

In February 2003 Bulgarian Nuclear Regulatory Agency issued to KNNP the Operation License for Unit 4 for the next 10 years

According to the newly established Safe Use of Nuclear Energy Act (SUNEA) the maximum licensing period for a nuclear facility is 10 years.

Updated SARs were presented to BNRA as a basis for issuance of the operational licenses in accordance to SUNEA requirements.

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UNITS 3&4 LICENSING CONDITIONS

General conditions:

- **Object of the license**
- **Main requirements**
- **Financial requirements**
- **Personnel requirements**
- **Radiation protection,Security and QA requirements**
- **Emergency preparedness requirements**
- **Nuclear materials and radioactive waste management**
- **Conditions for license changes and renewal**
- **Applicable legislation**

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UNITS 3&4 LICENSING CONDITIONS

Specific conditions:

- **Completion of the Complex Modernization Program within 2003**
- **Plant Long Term Program on specific subjects for further improvement of the units safety level**

UNITS 3 & 4 MODERNIZATION PROGRAM

- **Units 1-4 Short Term Modernization Program**
  - **Duration 1991-1996**
  - **Design changes 984**
- **Units 1-4 Complex Modernization Program –PRG 97A**
  - **Duration 1997-1999**
  - **Design changes 468**
- **Units 3&4 Program – PR 209 M**
  - **Duration 2000-2002**
  - **Design changes 375**

UNITS 3 & 4 MODERNIZATION PROGRAM: RESULTS

OPERATIONAL AREAS OF IMPROVEMENT:

- **Management,Organization&Administration**
- **Training &Qualification**
- **Operations**
- **Maintenance**
- **Technical Support**
- **Radiation protection**
- **Chemistry**
- **Emergency Planning &Preparedness**

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UNITS 3 & 4 MODERNIZATION PROGRAM: RESULTS

DESIGH AREAS OF IMPROVEMENT:

- **Reactor core**
- **Systems & Components**
- **I &C and Electrical**
- **Seismic & Fire protection**
- **Accident Analysis**
- **Confinement**
- **Aging Management**
- **PSA**
- **SAR**
- **UNITS 3&4 REQUALIFICATION INTO MODEL 209 M**

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UNITS 3 & 4 MODERNIZATION MAIN ACHIEVEMENTS:

- **High reliability of the primary circuit pipeworks**
- **Core cooling in all postulated events**
- **Containment localization function for all postulated events**
- **Compliance with ALL APPLICABLE IAEA recommendations:**
  - **-Applicable to WWER-440/230**
  - **-Applicable to WWER-440/213**
- **All safety issues identified by IAEA resolved**
- **SAR fully updated in line with the Periodic Safety Review**
- **Residual Life Time Management Program for the next 15 years- AMP dedicated to all structures,systems and components relevant to safety and critical to residual service life.**

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UNITS 3 & 4 LONG - TERM PROGRAMS:

TERM 2004 -2005

- **Activities on probabilistic safety analyses:**
  - **- PSA level 2**
  - **- Safety Monitoring**
  - **- Precursor event analysis**
- **Modernization of Accident Localization System:**
  - **- Installation of Passive Hydrogen Recombiners**
  - **- Installation of Post Accident Filter Venting System**
- **Qualification of non-destructive examination of components,important to safety:**
  - **- Qualification of the different primary circuit ISI techniques**
- **Extension of Symptom-based Emergency Operating Procedures towards severe accident situations.**

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UNITS 3 & 4 LONG - TERM PROGRAMS:

TERM 2004-2005

- **Modernization of I&C Systems:**
  - **-Operator support computer system**
  - **-Completion of Post Accident Monitoring Instrumentation**
  - **-Continuation of I&C replacement**
- **Future activities on seismic qualification**
- **Implementation of measures for severe accident management**

TERM 2009

- **Management of the lifetime of the units equipment,systems and components – monitoring and evaluation measures,developed by the overall RLT evaluation conducted in 2002**

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UNITS 5&6 LICENSING CONDITIONS

In October 2003 Bulgarian Nuclear Regulatory Agency issued to KNNP the Operation Licenses for Unit 5 and 6 for the next 6 years.

The last edition of SAR were presented to BNRA as a basis for issuance of the operational licenses in accordance to the Safe Use of Nuclear Energy Act requirements.

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UNITS 5&6 LICENSING CONDITIONS

Specific conditions:

- **Completion of the Units 5&6 Modernization Program evaluated by an IAEA Mission in July 2000. TERM 2003-2006.**
- **Completion of planned specific measures. TERM 2003-2006.**
- **Completion of PSA Program for low power and shut down mode and PSA level 2 and 3. TERM 2003-2006.**
- **Completion of Units 5&6 SAR updating. TERM 2003-2006**
- **Periodic safety review of units 5&6. TERM 2006-2007.**
- **Development of Nuclear Safety and Radiation Protection Program considering the results of PSR. TERM 2007-2008.**
- **Completion of the program for Symptom-based Emergency Operating Procedures. TERM 2003-2006.**

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UNITS 5 & 6 MODERNIZATION PROGRAM

- **Developed 1995-2000 on the basis of:**
  - **New international requirements to safety**
  - **Deviations from ОПБ-88**
  - **Safety assessments of WWER-1000/320**
  - **Recommendations made by the Plant General Designer**
  - **OSART and ASSET Missions in KNPP**
  - **Operating feedback and experience**
  - **Studies performed in Bulgaria**
- **Reviewed and approved by IAEA in 1995 and 2000**
- **Implementation 1995 – 2006**
- **Total number of measures 204**

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UNITS 5 & 6 MODERNIZATION PROGRAM

AREAS OF MODERNIZATION

GROUP 1: Design oriented measures to improve plant safety

- **New diagnostics and control systems**
- **Additional systems for severe accidents**
- **Operating conditions improvement and status monitoring**
- **Seismic stability and fire resistance**

GROUP 2:Analysis and additional research

- **Accident analysis**
- **Mechanical analysis of safety significant equipment**
- **Risk analysis of external and internal events**
- **Classification and qualification of components and equipment**

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GROUP 3: Replacement of equipment under expiry and critical importance

- **Control Systems**
- **Measuring devices**
- **Safety System Equipment**
- **Equipment important to unit availability**

GROUP 4:Improvement of plant operating conditions

- **Personnel training**
- **Maintenance and support optimization**
- **Documentation improvement**

GROUP 5:Measures related to decommissioning of plant installation

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UNITS 5 & 6 MODERNIZATION PROGRAM

Current status of Modernization Program Measures

YEAR	COMPLETED MEASURES
1995-2000	79
2001	3
2002	12
2003	43
2004	34
2005	33

Total number 204

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KNPP

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STUK

FINNISH APPROACH TO NPP LICENSING AND LIFETIME MANAGEMENT

Hannu Koponen
STUK

EBP on Safety Aspects of Long Term Operation of Pressurized Water Reactors,
Vienna 16 - 18 March, 2004

STUK

Contents

- National policy and licensing situation
- Main projects at nuclear power plants
- Regulatory control of lifetime management
- Future challenges

STUK

National Policy on Lifetime Management

Decision of the Council of State (395/1991) on General Regulations for the Safety of NPPs:

- Operating experience from NPPs as well as results of safety research shall be systematically assessed and followed.
- For further safety enhancement action shall be taken which can be regarded as justified considering operating experience and the results of safety research as well as the advancement of science and technology.

STUK

License Renewal in 1990's

STUK requirements to the licensees

- refer to legislative documentation to be supplied
- evaluation of the compliance with regulations and YVL Guides
- review of safety based on safety factors / IAEA-50-SG-012
- main emphasis on power upgradings and related accident and transient analysis
- PSA 1 and 2 levels

STUK

Licensing Situation

New operating licenses for all four units

- licenses of Loviisa plants valid up to the end of 2007
- after Loviisa 1 license expires, 31 years operation is over
- licenses of Olkiluoto plants valid up to the end of 2018, periodic review by the end of 2008
- after Olkiluoto 1 license expires, 40 years operation is over

Modernisation and power uprating connected with the license renewal processes

- Olkiluoto 710 -> 840 MWe (net)
- Loviisa 445 -> 488 MWe (net)
- severe accident management systems commissioned

STUK

Licensing Situation cont.

Decisions in Principle

- spent fuel disposal facility (2001)
- new nuclear power plant unit (2002)

Application for the construction of the new unit (2004)

STUK

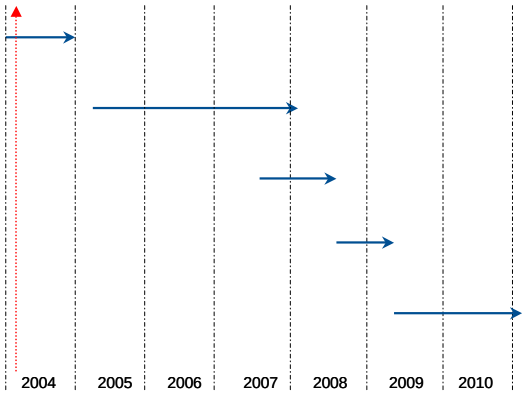
OL3 Project

- Plant vendor and type
  - Framatome ANP
  - EPR (European Pressurised Reactor)
- Main Technical Features
  - Thermal power 4300 MW
  - Electrical output ~ 1600 MW
  - Loops 4
  - Safety systems 4 redundancies
- Site
  - Olkiluoto

STUK

OL3 Main Schedule

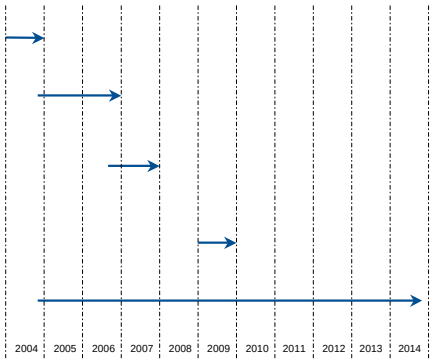
- **Construction License**
- **Construction**
- **Operating License**
- **Trial Run**
- **Operation**



STUK

Loviisa NPP - Future Projects

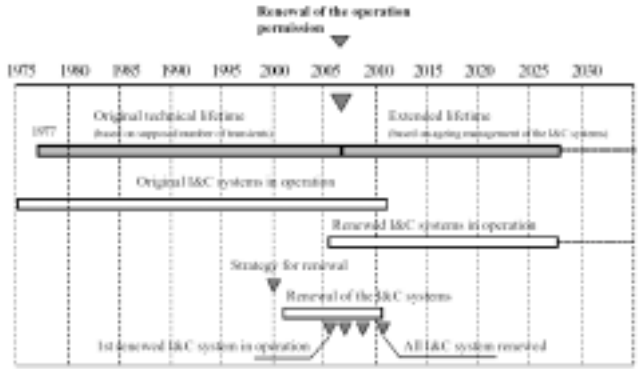
- **LO 1 RPV Operating license**
- **LO Waste solidification plant**
- **LO1 and 2 Operating License Renewal**
- **LO 2 RPV Operating license**
- **LO 1 and 2 I/C Modernisation**



STUK

MICCO project, Licensee strategy

- total renewal of plant unit's I&C systems



STUK

MICCO project, Licensee strategy cont.

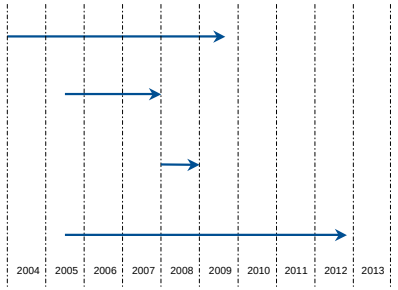
- Renewal of the I&C system will be carried out in four steps
  1. limited scope of systems classified to safety class 3, 4 and non-safety related (e.g. reactor power limitation and control)
  2. reactor protection systems
  3. I&C of primary side systems
  4. I&C of secondary side systems
- Parallel renewal at both NPP units in two years shift
- New buildings for the new automation (installations and testing during plant units operation)

➔ Field installations, connections to the existing systems and modifications of the main control rooms are performed during normal annual outages, without remarkable delays.

STUK

Olkiluoto NPP - Future Projects

- **OL 3 Project**
- **OL1 and 2 Turbine Island Modernisation**
- **OL1 and 2 Periodic Safety Review**
- **OL 1 and 2 I&C Modernisation**



STUK

Control of the lifetime management by STUK

During licensing

- ageing shall be considered during the design of the NPP
- one of the key issues of the renewal of operating license or the periodic safety review

During the operation

- periodic inspection programme
  - ageing one of the key processes inspected
  - covers the overall lifetime management of the NPP
  - supported by separate technical inspections (mechanical engineering, electrical and I&C, construction, chemistry)
- reporting of the lifetime management programme
  - the coverage of the ageing management programme has to be justified
  - yearly reporting of the findings and plans of the ageing management of the mechanical, electrical and I&C systems and components
  - every 5 years reporting of the ageing of the cables

STUK

Future challenges in the lifetime management

- qualification of the non-destructive testing systems, updated YVL 3.8 guide issued 2003
- modernization of the instrumentation and control systems, updated YVL 5.5 guide issued 2002
- use of PSA, application of the risk informed regulations, updated YVL 2.8 guide issued 2003
- competence of the personnel
  - core competences needed by the licensees
  - availability of the technical support
  - outsourcings of the activities
  - training of the new generation
- effectiveness of the ageing management programme

STUK

Ensuring the research funding

- Amendment of the Nuclear Energy Act at the beginning of the year 2004
  - funding for the national research programmes of the nuclear safety research (SAFIR) and the research of the nuclear waste management (KYT) collected from the licensees
  - SAFIR 2004
    - also funding from other sources
    - funding from the fees 2,7 million €
    - the total volume 4,8 million €
  - KYT 2004
    - the volume 1,1 million €

HAEA NSD

SHORT COUNTRY REPORT OF HUNGARY

Lajos Vöröss
Hungarian Atomic Energy Authority

IAEA EBP Steering Committee Meeting of SALTO
Vienna, 16-18, April 2004.

HAEA NSD

Aftermath of INES-3 Paks Incident

After having stabilised the situation inside the reactor hall there are two main tasks to perform:

1. Recovery of service shaft No.1 of Unit 2. (SS) where the incident occurred

2. Restart of Unit 2. as soon as possible

HAEA NSD

Recovery of SS

- recovery project and team established at Paks NPP

- tendering process won by Russian consortium led by TVEL; FRAMATOM had bidden as well

- 6-8 months preparatory, 2-3 months implement phases planned, excluded licensing time

- special tools for manual removal of debris are to be used

- manipulation is to be carried out from a movable platform placed above the cleaning tank

- C-30 type container will be used for transport of spent fuel elements

HAEA NSD

Recovery of SS (cont'd)

- placement of C-30 on the top of RPV is envisaged
- since SS unavailable there is a need for C-30
  - to construct a special support structure
  - crane modification to increase reliability of heavy load transport above RPV and Unit 2.
- autonomous cooling facility for SS
- separation of SS from spent fuel pool and from other systems of Unit 2.
- installation of mobile water cleaning device (NURES,Finland)

HAEA NSD

Recovery of SS (cont')

- reliable neutron flux and boron concentration measurement in SS
- increased radwaste storage capacity
- free positions made available for capsules/cartridges containing debris in spent fuel pool
- regulatory licensing process
  - requirements for recovery
  - authorisation in large number of modifications and construction

HAEA NSD

Restart of Unit 2.

- after long-term shut-down status with intact main equipment but contaminated by uranium and transuran isotopes - cleaning is necessary
- interrupted refuelling and maintenance occurred
- RPV used as temporary storage tank of spent fuel assemblies
- low enrichment fresh FE supply and rearrangement of spent fuel pool
- reuse of cleaned spent fuel assemblies is limited

HAEA NSD

Restart of Unit 2. (cont'd)

- conception for short term operation cycle developed
  - refuelling and yearly maintenance have to be completed
  - suitable core for operation during the preparatory phase of the recovery is possible (about 4 months long)
  - regulatory requirements for both refuelling and restart/operation phases developed
  - planned restart time is still uncertain
- significant interest from media and public follows

HAEA NSD

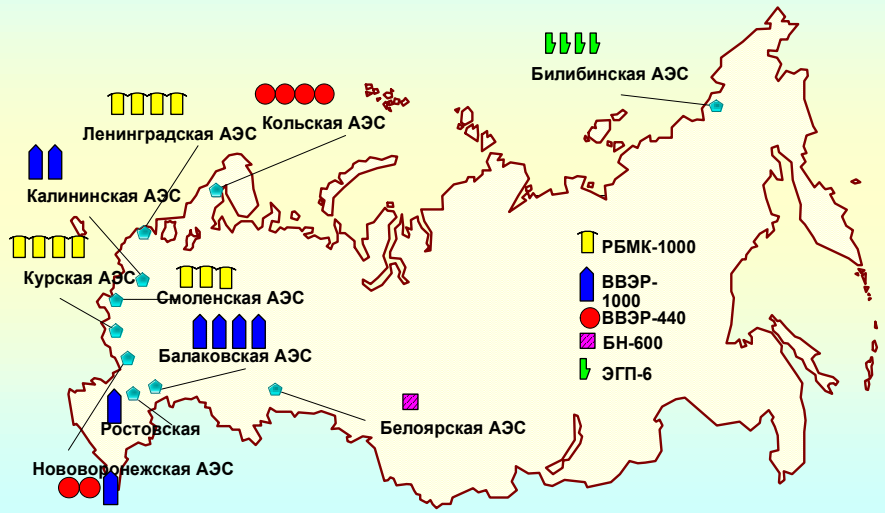
International Assistance

- IAEA - two international missions provided
- GAN (Russian Regulator) - on contractual arrangement, focuses to review QA of Russian contractors
- US NRC/IAEA - gives advice to review conditions of restart of Unit 2.

NOTE: In spite of the incident lifetime extension and power uprating of the units are insisted on

Основные итоги эксплуатации АЭС России в 2003 году

Карта расположения АЭС России



Краткие итоги работы АЭС России в 2003 году

Выработано электроэнергии	*148618,3* млн.кВт.ч	что составляет
	101,3 %	к заданию ФЭК
	106,3 %	к прошлому году

✹ В сравнении с прошлым годом КИУМ увеличился на *4,6%* и составил – *76,3 %*

С начала эксплуатации по 2003 год включительно АЭС России выработали – 2 819 млрд.кВт ч

Это дало экономию:

➔ условного топлива – 902,1 млн. т

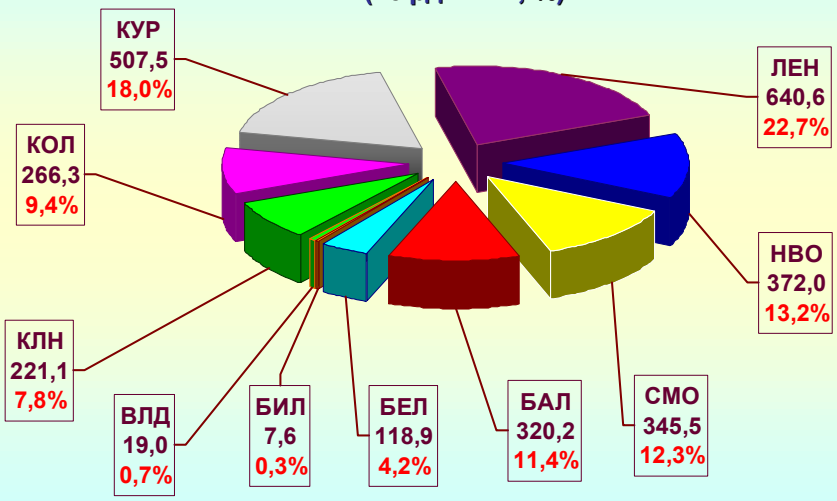
(это более 26 млн. вагонов или 528 тыс. железнодорожных составов)

или

➔ природного газа – 986,7 млрд. $м^3$

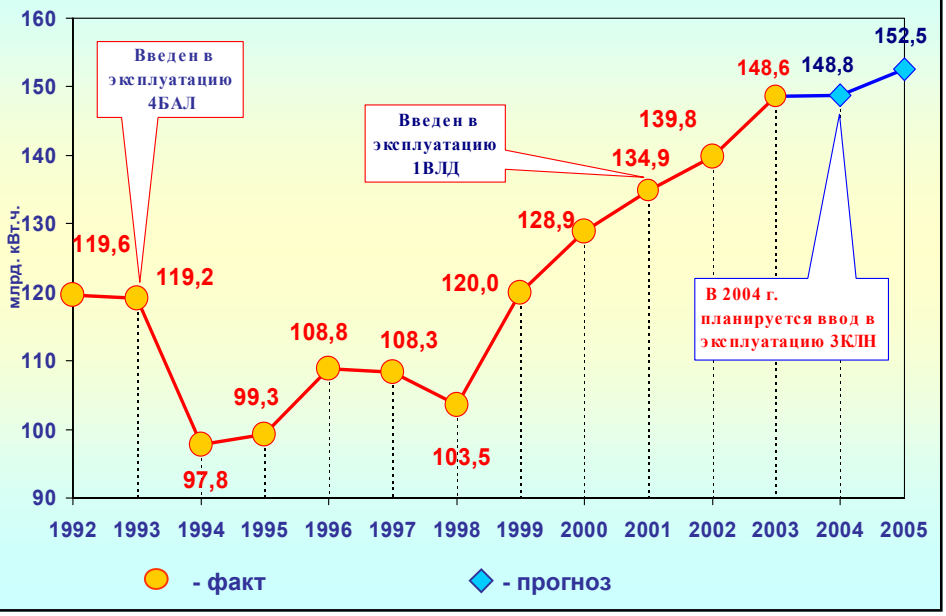
Доля выработки электроэнергии АЭС России с начала эксплуатации по 2003 год

(млрд.кВт.ч, %)



Суммарно: *2 818,6* млрд.кВт.ч

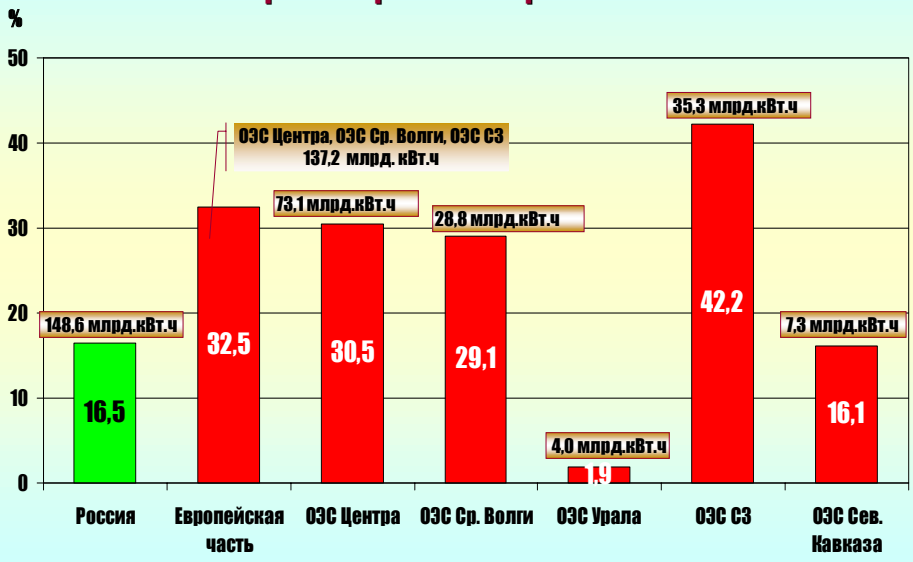
Выработка АЭС России в 1992-2005 г.г.



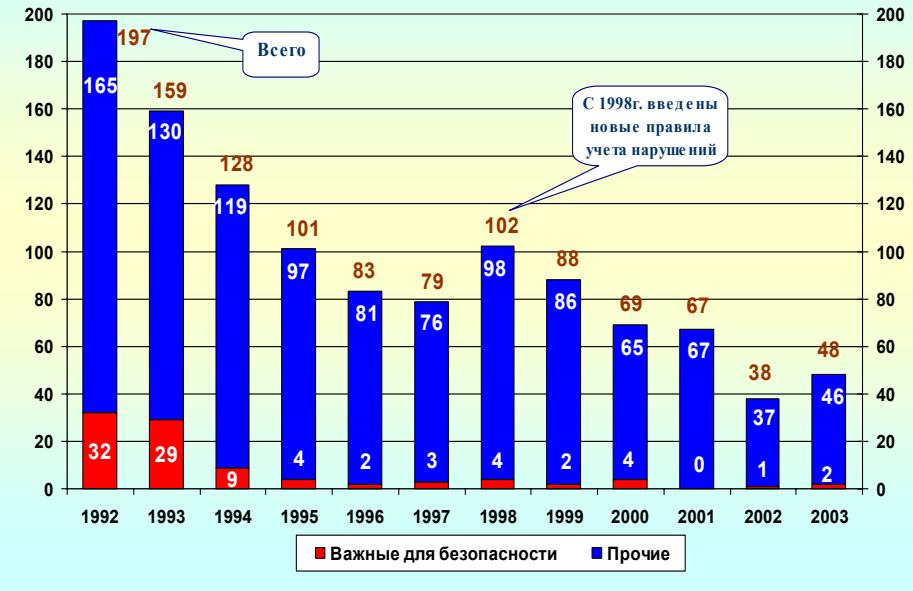
КИУМ АЭС России в 1992-2005 г.г.

Суммарная выработка электроэнергии в России за 1998-2003 гг.

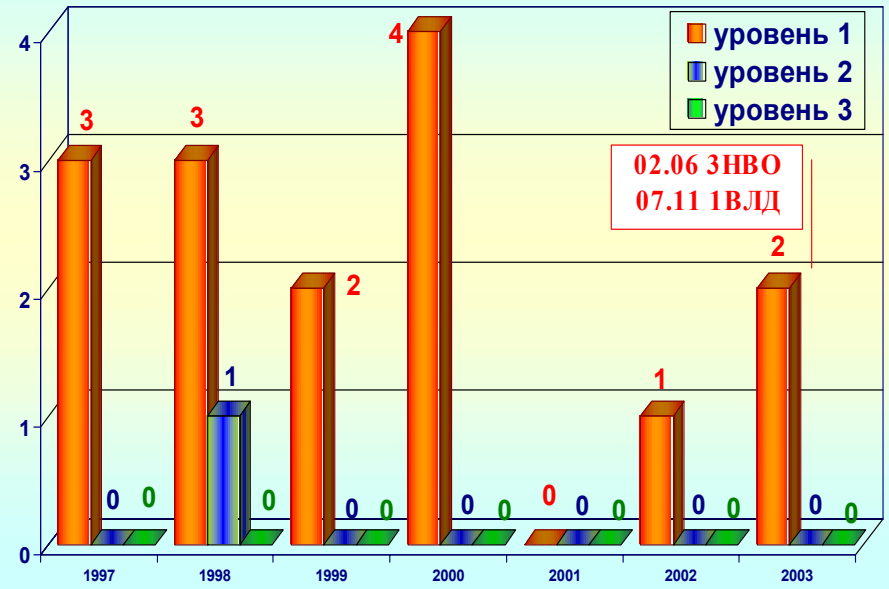
Доля выработки АЭС от выработки электроэнергии по регионам в 2003 г.



Динамика нарушений в работе АЭС России в 1992-2003 г.г.

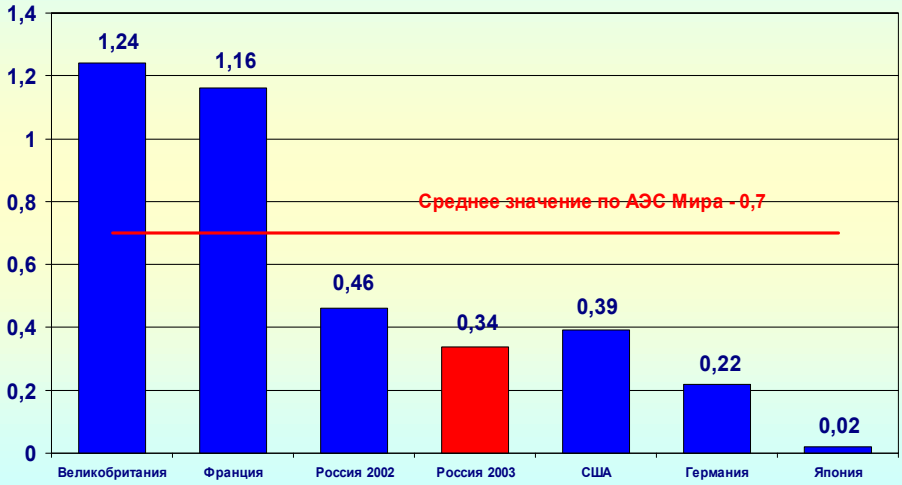


Динамика нарушений, важных для безопасности АЭС

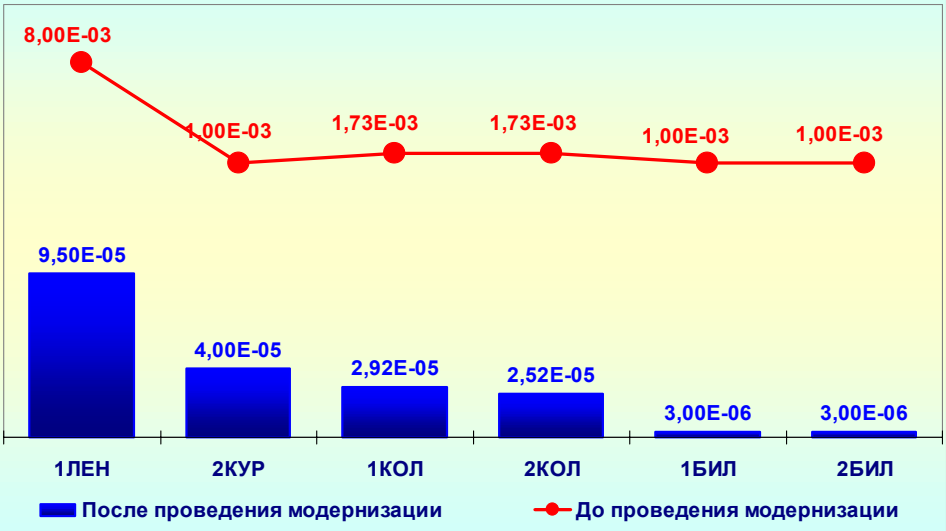


Динамика автоматических остановов реакторов из критического состояния АЭС России и АЭС Мира (по методике ВАО АЭС) 1992-2003 г.г.

Внеплановые автоматические остановы из критического состояния на 7000 часов работы реактора по странам мира в 2002 г. и по АЭС России за 2003 г.



Результаты модернизации и повышения безопасности энергоблоков



2КУР, 1ЛЕН и 2БИЛ – после завершения модернизации 2004 г.

"Safety aspects in extension of WWER NPP operating life using the example of Novovoronezh NPP"

Dragunov Yu. G., Sorokin N.M., Adamchik S.A., Nikitenko M.P., Chetverikov A.Eu.

Operating life extension

Regulatory basis:

- **Principal possibility of NPP Unit operating life extension is defined in OPB-88/97 (item 5.1.14);**
- **Requirements for extension of operating life of RP equipment and pipelines are defined in i. 2.1. 11 of "Rules..." PNAE G-7-008-89;**
- **Federal regulations "Basic requirements for NPP Unit operating life extension" NP-017-2000**

Criteria of NPP Unit possible operation within the period of extended operating life

According to NP-017-2000

- **4.1. NPP Unit operation is possible provided the required measures are taken aimed at bringing NPP Unit in compliance with the requirements of valid regulations;**
- **4.2. Technical state of NPP Unit shall meet the requirements of technical documentation;**
- **4.3. Within the period of extended operating life the activities on safety improvement shall be carried out;**
- **4.5. Equipment reliability (service life) shall be controlled;**
- **5.4. Operating organization shall provide the safety justification of NPP Unit according to the regulations valid.**

Concept of WWER-440 (V-179) safety improvement at Novovoronezh NPP, Units 3&4

- **upgrading the safety systems to provide for mitigation of consequences of primary coolant leak accidents, equivalent of leak of Dnom100mm, using the design limits;**
- **upgrading the safety systems and systems important to safety to reduce a probability of occurrence of accidents with loss of heat removal from the reactor core through the secondary circuit;**
- **improvement of the systems of early detection of small leaks on the basis of implementation of LBB concept to reduce a probability of occurrence of primary coolant leak accidents;**
- **implementation of facilities for management of beyond design basis accidents to mitigate their consequences;**
- **upgrading the reactor plant control, monitoring and protection systems.**

Basic principles of defining the scope of the Unit upgrading

1. Deterministic analysis of the project compliance with the safety regulatory documents:

- **Revealing of deviations from the regulatory requirements**
- **Classification of deviations as to the extent of their effect on assurance of defense-in-depth. Safety categories**
- **Development of measures on elimination of basic safety deficits**

2. Probabilistic safety analysis:

- **Determination of summation frequency of the core damage**
- **Recommendations on upgrading to reduce the core damage frequency**

Analysis of the Unit compliance with the requirements of safety regulatory documents valid

TECDOC – 640

Final report on accident analysis TASIC-91. Project 1.3 – "Accident analysis"

1st level PSA on the basis of the existing state of NV NPP, Units 3&4

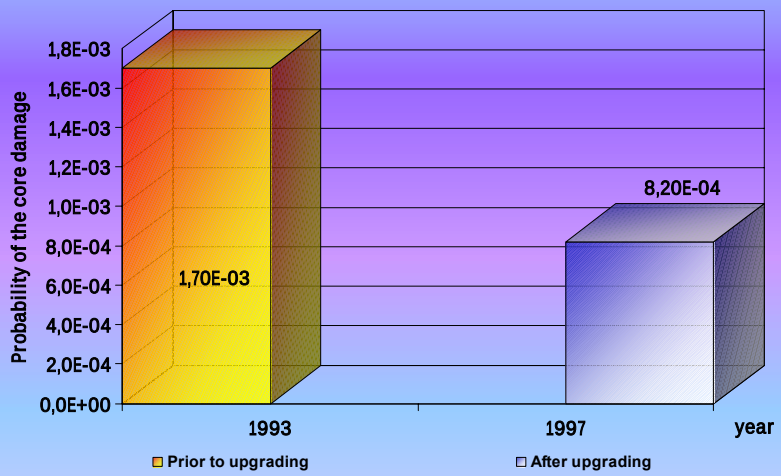
List of technical measures aimed at reaching the acceptable safety level of Unit

Basic technical solutions on safety systems upgrading

- Provision of two independent power sources of the 2nd category
- Mounting additional equipment to ensure redundancy
- Replacement of obsolete equipment and systems
- Separation of Unit-common systems into independent systems

- **Stage 1 (“small upgrading”) 1986-1999**
- **Provision of RPV brittle strength**
- **Upgrading the control and monitoring systems, mounting the additional systems**
- **Improving the reliability of heat removal through the secondary circuit**
- **Reducing a probability of safety systems common cause failure at the expense of physical separation of SS mechanisms**
- **Replacement of equipment with exhausted service life (reversible diesel-generators, storage battery, etc.);**
- **Upgrading the spent fuel pond facing alongside with mounting of leaks monitoring and collection system**
- **Implementation of analytical simulator for training the MCR operators**

Results of upgrading the NV NPP, Unit 3, Stage 1



Stage 2 ("large upgrading") 2000-2001:

- **equipping the reactor plant with two sets of control and monitoring systems;**
- **doubling the power of emergency supply sources to increase the number of safety system mechanisms actuated under loss of power modes;**
- **mounting the additional systems of emergency feedwater supply to steam generators;**
- **mounting the additional equipment to provide redundancy of safety system active components;**
- **separation of common station systems important to safety into Unit-specific systems (service water system, planned cooling down system);**
- **upgrading the system of accident localization with implementation of jet-eddy condenser.**

Results of the work on upgrading stage 2

- Computer system of safety parameters representation
- Two sets of emergency protection are installed
- Unified technical facilities for monitoring and control of safety systems are put into operation
- Up-to-date system of neutron flux monitoring is implemented
- Impulse power controller are replaced with the automatic controllers
- Reactor power governors are implemented
- A set of process parameters protection equipment is implemented

Results of the work on upgrading stage 2

- Up-to-date system of the reactor core monitoring during refuelling is implemented
- Up-to-date system of in-core instrumentation is implemented
- Safety boron injection system is modernized
- Sprinkling system is modernized
- Additional system of emergency feedwater supply to SG is put into operation
- SG SV, PRZ SV are replaced
- Measures are implemented on additional independent feedwater supply to SG
- MSIVs are installed

Results of the work on upgrading stage 2

- Complex of measures is carried out on ensuring the integrity inspection of the primary equipment and pipelines
- LBB concept is implemented
- Leak-tightness of the sealed compartment is improved
- Jet-eddy condenser is implemented
- Service water supply system is upgraded
- Reliable power supply system is modernized
- Additional source of emergency power supply of the Unit is implemented
- Radiation and fire protection systems are upgraded

Results of the work performed

Unit 3 of NV NPP has been brought to the acceptable safety level with consideration of the requirements of up-to-date standards for assurance of the following principles:

-redundancy;

-independency;

-single failure;

-protection against common cause failure

Results of upgrading the NV NPP, Unit 3

Change in the number of deviations by categories and levels of defense-in-depth

Level of defense-in-depth	Prior to modernization				After modernization			
	Σ	1	2	3	Σ	1	2	3
Conditions of NPP siting and prevention of operational occurrences	238	92	106	40	135	104	29	0
Prevention of design basis accidents by the normal operation systems	50	28	22	0	31	23	8	0
Prevention of beyond design basis accidents by the normal operation systems	28	0	15	13	7	1	8	0
Management of beyond design basis accidents	8	0	6	2	3	0	3	0
Emergency planning	9	0	9	0	3	0	3	0
Deviations IN TOTAL	333	120	158	55	179	128	51	0

Results of upgrading the NV NPP, Unit 3

Change in the number of deviations from the requirements of regulatory documents

Change by types of regulatory documents	Prior to modernization				After modernization			
	Σ	1	2	3	Σ	1	2	3
General provisions for safety assurance of nuclear power plants OPB-88/97, PNAEG-01-011-97	36	15	14	7	13	5	8	0
Code for designing earthquake-resistant nuclear power plants PNAEG -05-006-87	8	0	8	0	0	0	0	0
Safety rules for storage and transportation of nuclear fuel PNAEG -14-029-91	6	5	1	0	2	2	0	0
Sanitary rules SP-AS-99 and Sanitary rules for designing STT SOT AS-91	25	8	14	3	18	12	6	0
Safety regulations for nuclear power plants PBYa RU AS-89	48	15	28	5	18	8	10	0
Rules for design and operation of NPP localizing safety systems NP-010-98	56	32	15	9	50	32	18	0

Results of upgrading the NV NPP, Unit 3

Change in the number of deviations from the requirements of regulatory documents

Change by types of regulatory documents	Prior to modernization				After modernization			
	Σ	1	2	3	Σ	1	2	3
General provisions for design and operation of emergency electric power systems for nuclear power plants PNAEG -9-026-90	19	3	6	10	2	1	1	0
Regulations for design and safe operation of the nuclear power plant equipment and pipelines PNAEG -7-008-89	15	9	4	2	8	7	1	0
Rules for design and safe operation of actuators of reactivity affecting components PNAEG -7-013-89	1	0	1	0	0	0	0	0
Safety rules in handling radioactive waste of nuclear power plants PNAEG -14-41-97	23	12	10	1	23	21	2	0
Collection, reprocessing, storage and conditioning of liquid radioactive waste NP-019-2000	12	3	9	0	12	11	1	0
Collection, reprocessing, storage and conditioning of solid radioactive waste NP-020-2000	2	2	0	0	2	2	0	0

Results of upgrading the NV NPP, Unit 3

Change in the number of deviations from the requirements of regulatory documents

Change by types of regulatory documents	Prior to modernization				After modernization			
	Σ	1	2	3	Σ	1	2	3
Handling the gaseous radioactive waste. Safety requirements NP-021-2000	1	1	0	0	1	1	0	0
Rules for designing the emergency electric power systems of nuclear power plants PNAEG -9-027-91	30	4	10	16	4	3	1	0
Valves for nuclear power plant equipment and pipelines. General technical requirements OTT-87	10	3	5	2	4	4	0	0
Civil engineering standards for nuclear power plants with different type reactors PiN AE-5.6	14	8	6	0	6	3	3	0
Fire safety code VSN 01-87 and Fire safety rules PPB AS-95	27	0	27	0	16	16	0	0
TOTAL	333	120	158	55	179	128	51	0

Results of upgrading
1. Elimination (compensatory measures) of deviations from the requirements of regulatory documents

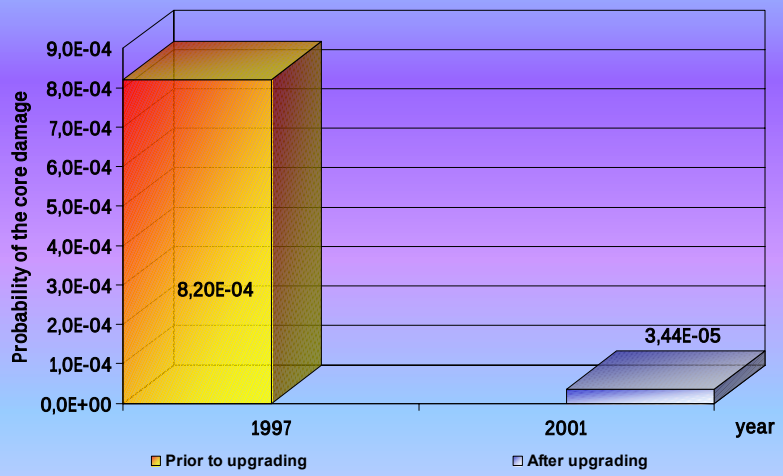
Following upgrading there are no deviations from the requirements of the valid regulatory documents of categories 3 and 4 (as to IAEA classification)

Results of upgrading
2. Broadening accident spectrum

1. Broadening the spectrum of design basis accidents is provided up to LOCA Dnom100.

2. Under beyond design basis accidents (LOCA Dnom 200 and more) the limitation of NPP radiation effect on the personnel, population and the environment is assured (by technical and organizational measures)

Results of upgrading the NV NPP, Unit 3 , stage 2



Basic results of the work

Safety level of Units is improved considerably

Residual life of equipment is justified for the period of additional operational life

The Unit safety for the period of additional operational life is justified on the basis of criteria of standards and regulations in the filed of nuclear power engineering

Licenses of Gosatomnadzor of Russia are obtained for operation of Novovoronezh NPP beyond the design service life

By the results of the work the following are developed:

Plans for implementing measures on further safety improvement including:

- **Upgrading the PRZ injection system**
- **Upgrading the under-dome space**
- **Implementation of additional protections and interlockings by SG water level, etc.**

IAEA EBP SALTO: Swedish statement

Second Steering Committee
March 2004
L G Larsson/E Liszka

Two Main Issues

Scope

Long Term Operation is a much broader concept than Life Time Extension

Participation

Broader experience base would be preferred

More countries should be involved in Programme

Safety is a Continuous Process of Modernisation

Modifications and replacements have to be made due to

- Operational experience
- Spare parts are difficult to find
- Control equipment becomes obsolete
- Aging of components and materials
- Technical renewal and backfitting
- Regulatory requirements
- Utility policies

An example: Oskarshamn 1

History

- The reactor is the first power producing reactor in Sweden
- Construction of the unit started 1966 and the operation 1972
- BWR, 1375 MWt, 465 Mwe
- Design - RPV with four external loops and MCP
- Design life 40 years

Oskarshamn 1 - Safety upgrading

- Several large modernisations
  - 1975 - Fire protection (CO2 + watersprinkling)
  - 1978 -79 - Cable separation, Aux FWS
  - 1988 - Installation of filtered venting of containment
  - 1993 - 96 - FENIX: RPV renovation, new FW lines, etc
  - 1996 - 98 - MAX: New RPV internals and MSI Valves
  - 1998 - 02 - MOD: New RPS(digital), 4 separated trains etc.
- Latest modernisation goal: 20 more years of operation
- Year 2012 (1972 +40) is today not very relevant from safety point of view (”safety space”)
- Year 2012 might however be very relevant for formal license (”licensing space”)

Scope: Swedish Conclusion

- Design Life Time is an important concept for the Designer
- For Safe Long Term Operation, Continous Upgrading and Modernisation (with ”quantum jumps”) is important.
- If this is done correctly, ”Life Time Extension” is not a specific Safety Issue, although it may be a very relevant Licensing Issue.

SALTO Country Participation

Country	*Repr. In Number of WGs*
Bulgaria	3
Czech Rep.	4
Finland	2
France	1
Hungary	4
Korea	1
Russia	4
Slovakia	4
Sweden	4
UK	1
Ukraine	4
USA	4

Participation: Swedish conclusion

A much broader participation from those countries with long term operating experiences of nuclear power would be desirable.

ЕНЕРГОАТОМ
ENERGOATOM
National Nuclear Energy Generating Company

ОСНОВНЫЕ ИТОГИ УЧАСТИЯ УКРАИНЫ В ДЕЯТЕЛЬНОСТИ ВНЕБЮДЖЕТНОЙ ПРОГРАММЫ МАГАТЭ

Шумков Э.А., директор по продлению эксплуатации, НАЭК «Энергоатом»

Основные направления деятельности и результаты (1)

«Комплексная программа модернизации и повышения безопасности энергоблоков атомных электростанций» (одобрена постановлением КМУ)

•устранение отступлений (несоответствий) в проекте установки от требований действующих в Украине нормативных документов;
•повышение надежности систем, оборудования и элементов, важных для безопасности;
•реализация рекомендаций экспертов МАГАТЭ по повышению безопасности АЭС и учет зарубежного опыта.

В результате внедрения программы, кроме повышения проектной безопасности, будет заменена значительная часть оборудования, выработавшего свой ресурс, на более современное.

Основные направления деятельности и результаты (2)

«Комплексная программа организационно-технических мероприятий по продлению срока эксплуатации АЭС Украины (на период 2003-2010 г.г.)»

•организация структуры по управлению и научно-технической поддержке продления срока эксплуатации АЭС;
•разработка нормативных документов, обеспечивающих проведение работ по оценке ресурса и продлению срока эксплуатации АЭС по согласованным с регулирующим органом процедурам.
•подготовка технико-экономического расчета затрат на продление срока эксплуатации АЭС Украины на период до 2025 года;
•разработка и начало реализации поблочных программ управления старением элементов блока АЭС.

Основные направления деятельности и результаты (3)

На текущий момент выполнены всесторонние анализы безопасности действующих АЭС на детерминистической основе с привлечением украинских специалистов и зарубежных экспертов. Выявленные проблемы безопасности распределены по важности влияния на глубокоэшелонированную защиту и, соответственно, приоритетности их реализации.

Результаты выполненных на данное время вероятностных анализов безопасности пилотных блоков АЭС показывают, что основной показатель оценки безопасной эксплуатации АЭС –

ЕНЕРГОАТОМ
ENERGOATOM
National Nuclear Energy Generating Company

ОСНОВНЫЕ ИТОГИ УЧАСТИЯ УКРАИНЫ В ДЕЯТЕЛЬНОСТИ ВНЕБЮДЖЕТНОЙ ПРОГРАММЫ МАГАТЭ

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EXTRABUDGETRY PROGRAMME ON SAFETY ASPECTS OF LONG TERM OPERATION OF PRESSURISED WATER REACTORS

BILL WEST – UK HSE/NII

IAEA VIENNA, MARCH 2004

UK Nuclear Programme

- Magnox Reactors
  - Gas cooled, graphite moderated, natural uranium in Magnesium alloy cladding
  - 24 Units built 1956 – 1976
  - 100 MW – 500 MW
  - 12 Units still operating
  - All will be closed by 2008
- Advanced Gas cooled Reactors
  - Gas Cooled, graphite moderated, enriched uranium, steel cladding
  - 14 Units built 1976-1989
  - 650 MW
  - All operating
- Pressurised Water Reactor
  - One unit 1300 MW built 1995
- Various Research/prototype reactors

Long term operation

- Ageing reactor population
- No specific term for licence.
- Licence is to “exist” not necessarily to operate.
- Operation is regulated by 36 permanent conditions attached to licence
- Safe operation assured by routine inspection, by short-term reviews (2-3 years) and by the 10 year periodic safety review process.
- Regulator has legal powers to close a reactor is it does not meet required safety standards.

Periodic Safety Review

- Broadly in line with IAEA Guide
- Comprehensive review of plant, procedures and the licensee itself
- Looks back at operation of plant
- Compares with current standards
- Backfits where necessary and/or practicable
- Looks ahead for 10 years
  - Ageing management
  - Identification of life limiting features
- Review takes about 3 years
- Review carried out by operator and assessed by regulator
- After a review operator needs regulator permission to continue to operate.

Periodic Safety Review
Typical outcomes of the early Magnox reviews

- Enhanced shutdown systems
- Enhanced post trip cooling systems
- Enhanced fire protection
- Enhanced emergency control room
- Seismic analysis
- Improved Steam generator tube failure analysis
- Level 2 PSA
- New Primary circuit integrity analysis
- Improved ageing management programme particularly:
  - Graphite moderator
  - Pressure vessel integrity

Early problems

- Interface between regulator and utility
- Assessment standards for old plant
- Prioritisation of issues
- Decision making
- Dealing with generic problems

Current Position and the Future Plans

- Magnox reactors have been through up to 3 Periodic safety reviews. No more to be done due to closure of Magnox programme
- AGRs have all completed 1 review. Preparing now for programme of second reviews
- PWR preparing for first Review.
- Although most of UK programme is gas – cooled technology, the principles of continued operation are the same.
- UK wishes to share its experiences and learn from others for the future.
- Hence our support for this project.

EUROPEAN COMMISSION
Joint Research Centre

Joint Research Centre

EC Contribution to Nuclear Safety

by
Michel BIETH (EC/JRC-IE)

IAEA Extrabudgetary Programme on Safety Aspects of Long Term Operation of Pressurised Water Reactors

Second Steering Committee Meeting 16-18 March 2004

EUROPEAN COMMISSION
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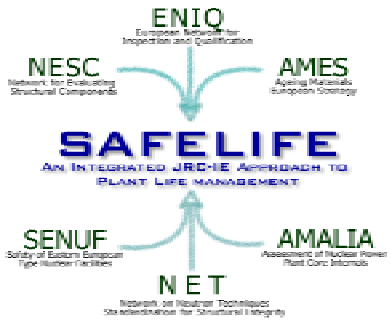
R & D Activities in the sector

- *SAFELIFE EC-JRC research action focuses on PLIM and includes:*
  - ***Networks**, used to bring together the key players in technical fields, to establish consensus R&D issues and promote best practices*
  - ***Contributions to related Shared-Cost R&D Actions (Integrated Projects and/or Networks of Excellence)***
  - ***Promoting actions to ensure best integration of Acceding Countries (Training & Collaboration)***



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R & D Activities in the sector (Cont[d])

EURATOM
TREN – RTD
FWP 5 & 6

- *SAFELIFE & DG RTD Associated Projects*

RPV
Piping Systems
Internals
Weldments
→ Integrity assessment
Fracture mechanics
Residual stresses
Thermal fatigue
(Re)-Embrittlement & ageing
In-service inspection
Maintenance

NDE methods for monitoring degradation
Risk management for PLIM
Safety culture management for PLIM
Others

- ✓ COBRA (VVER 440 RPV Surveillance temperature & Dosimetry (in-situ)
- ✓ GRETE (Round-Robin of NDT for ageing monitoring)
- ✓ ATHENA (PLIM/PLEX, VVER 440 RPV embrittlement & re-embrittlement, PRIMAVERA)
- ✓ PISA (Phosphorus role on embrittlement)
- ✓ FRAME (Fracture toughness trend curve validation)
- ✓ REDOS (Reactor dosimetry optimisation)
- ✓ THERFAT (Thermal fatigue assessment)
- ✓ SMILE (Warm-Prestressing effect)
- ✓ FITNET (Neutron techniques for microstructures examination)
- ✓ INTERWELD (Irradiation effects on Stainless Steel HAZ)
- ✓ ADIMEW (Integrity assessment of dissimilar welds)
- ✓ ENPOWER (Optimisation of weld repairs)
- ✓ SPIQNAR (Signal Processing & Improved Qualification)
- ✓ NURBIM (Risk-based [Informed] Inspection Methodology)
- ✓ VOCALIST (Constraint-based structural integrity methodology)

✓ **PERFECT** (Irradiation damage modeling / microstructure > integrity)

➢ **Integrated approach to R&D activities on critical issues for PLIM of ageing NPPs (both western and Russian-type)**

➢ **European best-practices and guidelines for deterministic and risk- informed structural integrity assessment of key components**

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Activities in the sector (Cont[d])

RELEX
AIDCO – ELARG
(1991 -)

JRC – Scientific & Technical Support:
- ✓ Project selection
- ✓ Project Description
- ✓ Specifications (Service & Supply)
- ✓ Tender evaluations
- ✓ Project Management
- ✓ Project Results evaluation & dissemination

- *TACIS / PHARE Nuclear Safety Programmes*

Funding for nuclear safety (1991-2003): **944 M€ for TACIS and 242 M€ for PHARE**

TACIS (2004-06)

➢ **Enhancing the Safety Culture, both at Regulator & Operator level**

➢ **Addressing Issues related to nuclear waste and spent fuel, including North-West Russia**

➢ **Contribution to relevant EU-supported international initiatives (Chernobyl Shelter Fund, MoU with Ukraine, NDEP Fund, Medzamor)**

➢ **Addressing Safeguards and Off-site Emergency Preparedness issues**

➢ **On-Site Assistance: Contribution to implementation of upgrading / modernisation measures, including licensing**

➢ **Design Safety: Comprehensive Assessment of physical phenomena of structures, systems & components of VVER & RBMK Reactors, PLIM, SR upgrading**

➢ **OSEP: Emergency Crisis Centres Upgrading, including Radiological & Meteorological Monitoring and Data exchange**

➢ **Waste Management & Safeguards: Long-term waste strategies & repositories, decommissioning, NUMAC**

➢ **Regulatory Authorities & TSO: Implementation of the legal and procedural Basis, documentation building & trainig**

PHARE (2003)

➢ **Enhancing the Regulatory Authority Effectiveness**

➢ **Increasing Radiation Protection**

➢ **Improvement of Radioactive Waste Management**

➢ **Heightening On & Off-Site Emergency Preparedness**

- **RPV embrittlement**
- **Primary circuit integrity (LBB)**
- **NDE / ISI**
- **QA & Component certification**
- **Maintenance**
- **RLT assessment**
- Reactor core safety analysis
- Accident analysis & management
- Operating procedures & Personnel training

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Joint Research Centre

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Activities in the sector (Contd)

TACIS On-Site Assistance (1)

Enhance operational safety through promotion of an effective safety culture

- *'Soft' on-site assistance:*
  - ***Organisation and management of operational safety***
  - ***Maintenance of systems and equipment***
  - ***Training and quality assurance***
  - ***Operational diagnostics, testing and monitoring of equipment***

- *Upgrading/replacement of systems and equipment:*
  - ***Identification***
  - ***Technical Specification preparation***
  - ***Tendering and procurement***
  - ***Project follow-up***

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Activities in the sector (Contd)

TACIS On-Site Assistance (2)

Equipment supply

- *Large number of implemented projects over 10+ years (150+):*
  - ***Some relevant examples:***
    - ***Diagnostic systems, Leak detection, Breakers, Batteries, Fire protection (including cables fire protection), Valves***
- *More recently: large Plant Improvement Projects (budget of about 10 Meuro per project)*
  - ***Russia:***
    - ***Novovoronezh:*** ***Unit 5:*** ***Replacement digital Reactor Protection System (contracted)***
    - ***Balakovo:*** ***Units 1&2:*** ***Replacement CIS/SPDS (contracted)***
    - ***Kalinin:*** ***Unit 2:*** ***Replacement CIS/SPDS***
      Unit 1&2: ***Replacement digital Reactor Protection System***
  - ***Ukraine:***
    - *Khmelnitsky:* *Unit 1:* ***Replacement digital Reactor Protection System***
    - ***Rovno:*** ***Units 1&2:*** ***Primary circuit overpressure protection system***
    - ***Zaporozhie:*** ***Units 1-6:*** ***Replacement of Steam Generator Valves***
    - ***South Ukraine:*** ***Boron Concentration Monitoring System, Chemistry Control System, Data Acquisition and Processing System***

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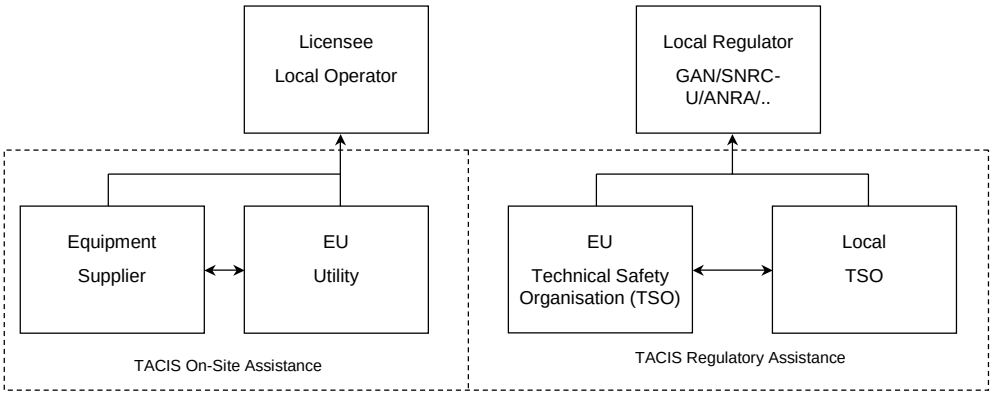
Activities in the sector (Contd)

TACIS Regulatory Assistance

Licensing of Plant Improvement Projects using the "2+2" approach



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Activities in the sector (Contd)

TACIS Design Safety

Large number of projects implemented. Main areas:

- *RPV embrittlement*
- *Primary circuit integrity (LBB application)*
- *Accident analysis, PSA (including code development/transfer)*
- *Also applicable to PLIM, number of projects on:*
  - ***NDE/ISI***
  - ***QA and component qualification***
  - ***Maintenance***

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Maintenance

- *SENUF*

✓ New "Forum" promoting ***Safety of Eastern European Type Nuclear Facilities*** by providing communication between Eastern European Nuclear Operators in Candidate Countries themselves and relations with Major Western European Nuclear Operators

✓ Main objective :Promote safety upgrading by technical exchange between operators

✓ Area of interest: Operational safety (Maintenance is selected as a prime topic)

✓ Working Group on NPP maintenance established (Collaboration Agreement signed by 9 institutes)

➢Task 1: Advanced strategies to optimise NPP maintenance (Status Report)

– To collect and analyse existing optimisation strategies (e.g. condition based, reliability centred, risk-informed maintenance)

– To identify differences and commonalities in the Western and Eastern European practice

- *Maintenance management*
- *Types of maintenance*
- *Maintenance optimization*
- *Intolerance of equipment problems*
- *Long range focus*
- *Maintenance personnel knowledge and skills*
- *Efficient and effective work management system*
- *Maintenance procedures*
- *Maintenance facilities, tools, equipment*
- *Procurement of parts, materials and services*
- *Maintenance history*
- *Area for improvement*

➢Task 2: Advanced and special tools, equipment, materials and processes (Database)

– Existence, parameters, experiences, contact person concerning the tools…

➢Anticipated Reports:

– NPP maintenance in CIS and CEEC (Evaluation report)

– Life management of VVER NPPs (Status report)

International Atomic Energy Agency

EBP-SALTO
Steering Committee Meeting
16-18 March 2004

Design Basis Documentation Management activities under TC funding

Csilla TOTH (NSNI/ESS/DU)

Regional Project: RER/9/069

Title:

WWER Design Basis Documentation Management System

Objective:

- To develope / adapt a methodology for systematic reconstitution of the design basis documentation (DBD) for water-cooled water-moderated power reactors (WWERs).
- To train the plants experts in application of the methodology so developed.

Regional Project: RER/9/069

Note:

1) Regional Project originally started as:
   WWER – 1000 Design Basis Documentation Management System
2) In 2003 the project was expanded also on WWER – 440

Time frame: 2001 – 2003

Participants:

Bulgaria, Czech Republic, Ukraine, Hungary & Slovakia (2003)

Russia (OKB Gidropress and EAP Moscow)

Regional Project: RER/9/069

Achievements:

- Guideline for "Design Bases Documentation (DBD) Collation and Maintenance" was issued for review
- National Guidelines were developed
- LP ECCS pilot – DBDs were developed

a) Pilot DBD s LP ECCS were developed by

Ukraine, Czech Republic (WWER 1000)
Czech Republic, Hungary (WWER 440)

a) Review of pilot DBDs

Reviewers:

Czech Republic, Bulgaria, Hungary, Slovakia, Russia

Regional Project: RER/9/069

IAEA Workshops

- Management for WWER Plants" - Design Basis Document Guidelines (2003) workshop – Vienna, March 2003
- IAEA workshop on Design Basis Document development - Prague, June 2003
- Final Workshop on Design Basis Documents and Pilots – Vienna, November 2003

Objective not performed:

- Training of plant experts is still to be performed

Other related IAEA activities

Configuration Management

- "Configuration Management in Nuclear Power Plants" IAEA Guideline Document IAEA Safety Standard Series (IAEA TECDOC 1335, issued January 2003)
- New IAEA Safety Report :
  "Application of Configuration Management in Nuclear Power Plants "
  (Focus on examples of events and challenges to CM, good practices)
- Workshop on CM and Design Basis Documents – Hungary, June 2003

International Atomic Energy Agency

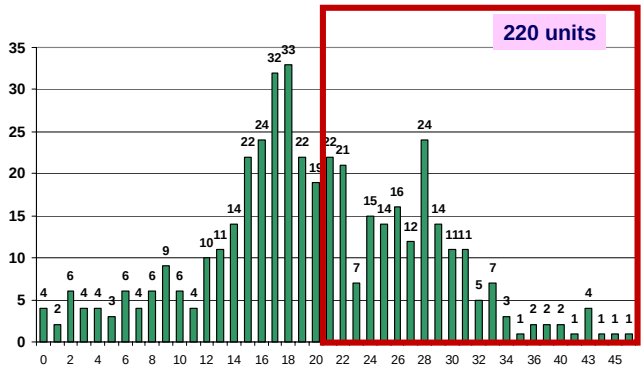
I&C Activities during the period from 2001 – 2003 and forthcoming events for 2004 – 2005

Presented by Ki-Sig Kang, Scientific Secretary TWG-NPP CI

Distribution of Reactors by Age as of 1st January 2003

Necessity of Modernization

- ***Competitiveness***
- ***Safety requirements***
- ***Ageing I&C equipment***
- ***Obsolete equipments***



1. Achievements in 2001 – Dec. 2003

Integration of information in control room and technical offices in NPPs	TECDOC – 1252 (01.11)
IT Impact on the Design Process and Plant Documentation	TECDOC – 1284 (02.4)
I&C licensing requirements harmonization	TECDOC – 1327(02.12)
Scientific basis and engineering solutions for cost effective assessment of software based I&C system	TECDOC – 1328(02.12)
Meeting of the Technical Working Group on Nuclear Power Plant Control and Instrumentation (TWG- NPPCI : 15 - 17 May 01)	Working Material
Effective management of NPP I&C modernization projects, including development of a database	Under printing (2003)
Plant Life Cycle and Aging Management Using Improved I&C Maintenance	Under printing (2003)

TECODC for Modernization of I&C

- **Cover the full range of modernization technical issues**
- **Identify methodologies, guidelines, processes, concerns, good practices**

- **Provide guideline for specification of req. for digital I&C**
- **Outline configuration to define a methodology to minimizes risk**

TECDOC on "Managing Modernization of of NPP I&C System"

Few to Several System Modernization

- *Minimize the impact on the plant availability*

Shut the plant down for as long as it takes to accomplish the planned I&C modernization activities

- *Not require the substantial management effort to coordinate modernization activities over several outages for systems to work together*

Modernization Approach

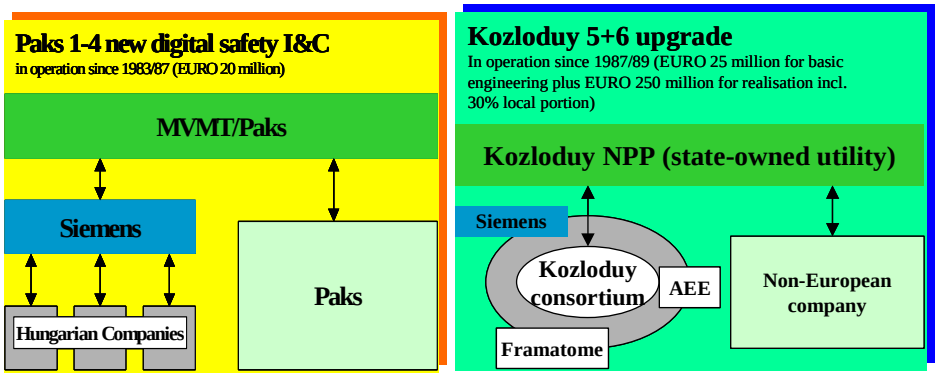
One-for-one replacement operation

- **Provide the exact functionality as the previous one including physical dimensions**
- **Add new functionality and enhancement opportunity limited**

Parallel operation

- **Add new modern system to back-up the existing analogue system to upgrade reliability**
- **Provide familiarization for operation and maintenance of the digital I&C system**

Cooperation with Utility and Manufactures



Modernization of Main Control Room

TECDOC on " Plant Life Cycle and Ageing Management Using Improved I&C Maintenance"

1. Introduction
2. Ageing and Obsolescence Process
3. I&C component of Interest
4. Review of Current Industry Activities to address I&C Ageing / Obsolescence
5. Relationship between I&C ageing, Life cycle management and maintenance
6. Key recommendations

Annex
1. Specific Examples of R&D Projects Related to I&C Component Aging
2. Qualification of a Smart Transmitter for Nuclear Safety Applications
3. Managing the Lifetime of Control Rod Drives in the Paks NPP
4. Developing an Aging-Management Program in the Kozluduy NPP
5. Application of Screening Criteria for Insulated Cables and Connections
6. Examples of Typical Stressors and Aging Effects for Cables

IAEA-TECDOC-XXXX

Plant life cycle and aging management using improved I&C maintenance

Report prepared within the framework of the Technical Working Group on Nuclear Power Plant Control and Instrumentation

INTERNATIONAL ATOMIC ENERGY AGENCY

Main Activities in 2004 - 2005 on NPP I&C

- **Develop guideline and recommendations**
  - Increasing Instrumentation calibration interval through on-line calibration technology
  - optimization of design margins and robustness for power uprating using software based I&C system in NPPs
  - Programming techniques to achieve the basis for licensing digital I&C system in NPPs
  - Assessment and need of I&C modification to restart design and construction on delayed NPP

Coordinate Research Projects
- Integration of software-based & analog systems and interfaces inside and outside of the control room focusing on human cognitive issues

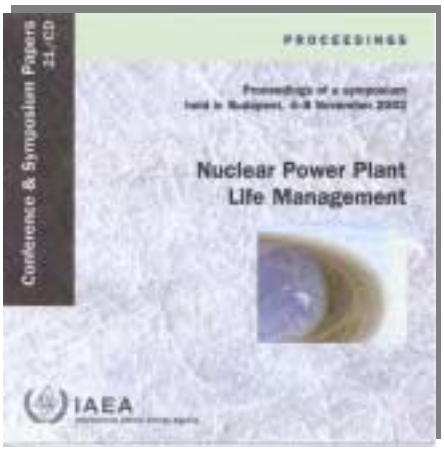
International Atomic Energy Agency

Plant Life Management Activities during the period from 2001 – 2003 and forthcoming events for 2004 – 2005

Presented by Ki-Sig Kang, Scientific Secretary TWG-LM NPP

CD-ROM Proceedings of the International Symposium on NPPS Life Management

- **Symposium on NPP Plant Life Management**
  - **4-8 Nov. 2002 in Budapest.**
  - **The proceedings of the symposium were published on CD-ROM in 2003.**
  - **138 participants from 30 countries and from three International organizations.**



Neutron Irradiation Embrittlement of LWR RPVs

1. Introduction
2. Reactor Pressure Vessels
3. Effects of irradiation conditions on the mechanical properties of the RPV steels
4. Current view on the mechanisms of irradiation damage in the RPV steels
5. Assessment of the mechanical properties of operating RPVs
6. Effect of Irradiation on RPV Operation
7. IAEA and international organization programmes
8. Current state-of –the art irradiation embrittlement
9. Conclusions

- Technical report series (TRS)
- 230 pages
- Lots of figures and data
- Finalization to submit the publication committee
- Publication in 2004

Guidelines for Application of the Master Curve Approach to Reactor Pressure Vessel Integrity

1. Introduction
2. Background
3. Sample Material and Application Issues
4. Determination of To for Sample Material
5. Determination of To for RPV Material
6. Fluence Projections
7. Deterministic Analysis and Methods
8. Probabilistic Analysis
9. Conclusions

- Technical report series (TRS)
- 100 pages
- Lots of figures and data
- Finalization to submit the publication committee
- Publication in 2004

Impact of PTS on RPV integrity

1. Introduction
2. World wide overview of PRS
3. PWRs and PTS
4. Regulatory approach for PWRs
5. WWER and PTS
6. Regulatory approach for WWER
7. PTS modelling
8. Materials aspects
9. NDE aspects
10. Thermal Hydraulics aspects
11. Structural and Fracture analysis
12. Large scale experiments and structural assessments
13. Recommendations and conclusions

- Prepared the extended drat material for technical report series
- Need the modification to meet the current status
- Publication in 2005

Guidelines for Prediction of Radiation Embrittlement of Operating WWER- 440 RPVs

1. Introduction
2. Reactor pressure vessels
3. Surveillance programmes applied
4. Irradiation programmes in surveillance channels –national/international programmes
5. Examination of RPV samples from operating plants
6. Current national procedures used for embritlement assessment/ prediction in Russia, Ukraine and Bulgaria
7. Description of the IAEA DB WWER -440 material data
8. Results from analyses of the IAEA DB WWER -440
9. Guidelines for prediction of radiation embrittlement of operating WWER- 440 RPVs

- Prepared the extended drat material for TECDOC
- Final meeting in June 2004 and Publication in 2004

2004 /5 Programmed Activities

- **Consultants Meeting**
  - Develop guidance document on effective ageing management methodologies for PLiM
  - Mechanism of nickel effect in radiation embrittlement of RPV steels
  - Guidelines for prediction of radiation embrittlement of operating WWER-440 RPVs
- **Specialist Meeting**
  - Core internals behaviour and technology for repair and replacement
  - Exchange of information on studies of irradiation effects in RPV steels

2004 /5 Programmed Activities

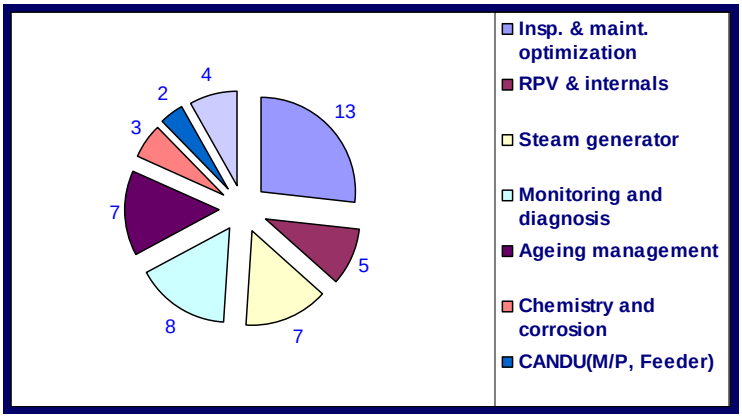
- **Database Development**
  - Develop international database on NPP Concrete structure
  - Develop additional modules (SG or Piping) of international database on NPP Life Management
- **Maintenance**
  - Development strategies and tool for predictive maintenance
  - CRP on verification of SG tube integrity

International Atomic Energy Agency

Optimization of NPP Performance and Service Life

RER/4/025

Number of Requests per Tech. Title from Eastern European Countries



Member States requests for RER/4/025

- **Plant License extension/renewal**
  - Methodology of periodic review
  - Experience in extension of operating service life
- **Training**
  - Training Centre cooperation,
  - training performance indicators,
- **Performance optimisation**
  - Assessment of equipment reliability
  - Evaluation of influence of accident analysis
  - Configuration Management

Member States requests for RER/4/025

- **Changing energy market**
  - Load control operation
  - Influence of commercial competition
- **Quality Management,**
  - supplier evaluation,
  - equipment qualification,
  - Quality system implementation
- **Spent fuel management,**
  - long storage systems

2004 Programme RER/4/025

(Optimization of NPP Performance & Service life, WS)

Type	Title	Location	Date
WS1	**IAEA/FORATOM 6th Joint Workshop**	**Vienna**	**5-7 Oct**
WS2	**Improvement of management and introduction of Quality Systems**	**Ukraine**	**3 Q**
WS3	**Residual lifetime evaluation and ageing management**	**Lithuania**	**2Q**
WS4	**Decommissioning**	**Bulgaria**	**4Q**
WS5	**Communicating of nuclear issues (including Safety) to the public and Media**	**Karlsruhe**	**1Q**

2004 Programme RER/4/025

(Optimization of NPP Performance & Service life. TM)

Type	Title	Location	Date
TM1	PENTRAC Annual Meeting		
TM2	Provisions for Long Term storage of spent fuel	Slovenia	2Q
TM3	Process of market deregulation and impact on NPP Management and operation.	Romania	4Q
TM4	Risk Based/Informed Applications in Maintenance and outage management	Paks	3Q
RTC1	Optimisation of service life of operating NPPs	Karlsruhe	4Q

International Atomic Energy Agency

Improvement of Primary Circuit Component Integrity
TC (RER/4/024) and RB

Huiping Cheng
Division of Nuclear Power

16 March 2004

1. Need

- Structural integrity is a high priority:
  - ✓Life management
  - ✓Operational performance

2. Main Objective

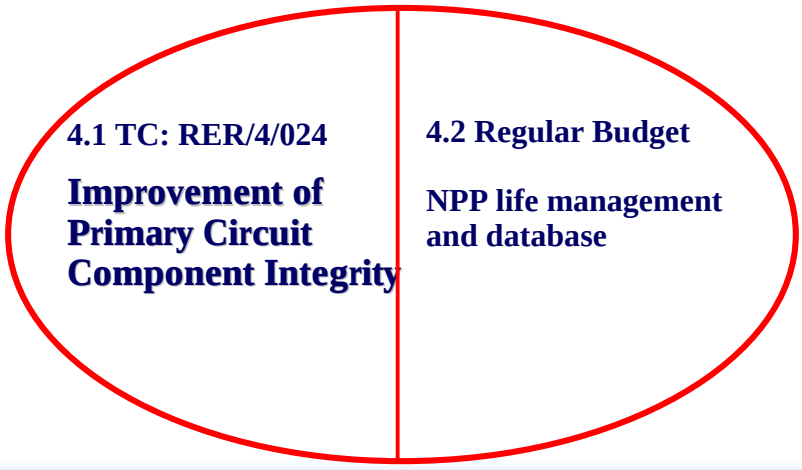
Long term component integrity as technical pre-requisite to life management via:

- Maintenance optimization
- RPV and internals
- Steam generator
- Ageing management
- Monitoring and diagnosis
- Water chemistry
- Other engineering issues

3. Technical focal areas

- Advanced NDE
- Effective ISI program
- Qualification of ISI systems
- Lifetime assessment
- Condition monitoring
- SG degradation, inspection and repair
- Water chemistry

4. Recent achievements and current plan



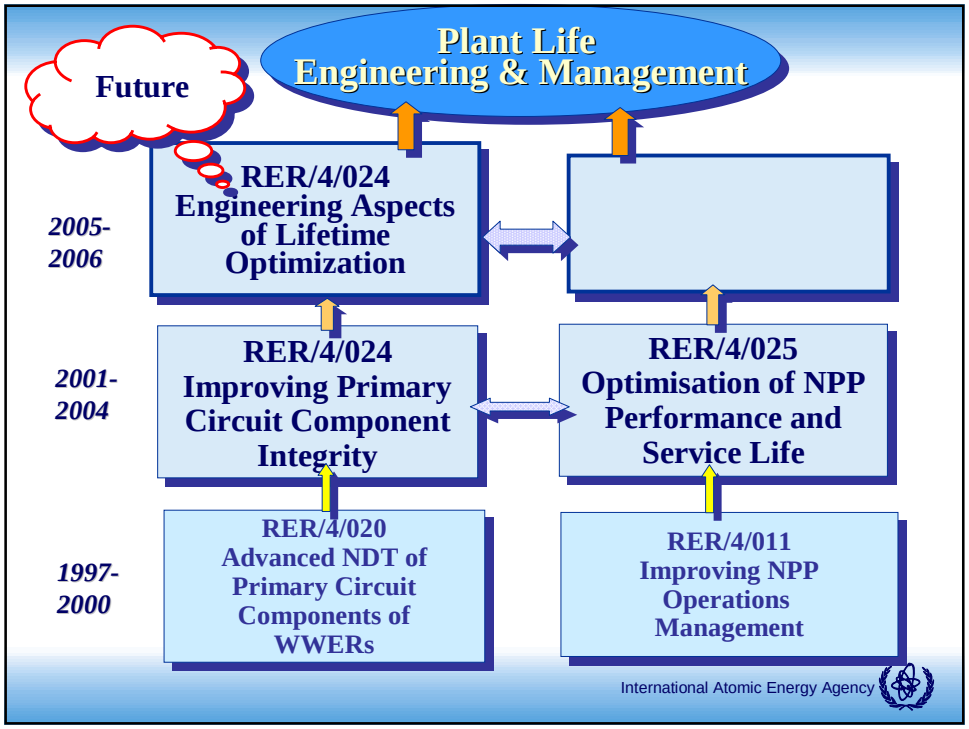
4.1 Project Implementation in 2003

- Operational monitoring of primary circuit component, 28-31 Jan., Kalinin
- Progress in ISI qualification, 3 – 5 Mar., Paks, Hungary
- Risk-informed ISI, 09 –12 Sept., CEZ Czech
- Impact of water chemistry regime, 17 – 21, Nov., SUNPP, Ukraine
- Lifetime evaluation of primary circuit components, 1 – 5 Dec., Zaporozhe, Ukraine

4.1 Plan of activities in 2004: 1 TM + 4 WS

Activities	Title	Date	Applying hosts
TM 1	HSG seminar	Mar	OKBG, Russia
WS 1	Advanced NDE	Feb	TECNATOM, Spain
WS 4	Monitoring & diagnosis technology	Jun	KARLSRUHE, Germany
WS 2	Pract. exp. of ISI qual. & RI-ISI	Sept	INETEC, Croatia
WS 3	Ageing, and residual lifetime assessment for primary components	Nov	? *Slovakia*

International Atomic Energy Agency



International Atomic Energy Agency

Future Focus is to be determined: Engineering Aspects of Component Lifetime Optimisation

- In-Service Inspection (ISI) programme optimisation
- Component condition monitoring
- Evaluation of component lifetime
- Ageing management of critical components

4.2 Regular Budget: Recent achievements

TECDOCs:

1. **Optimization of NPP maintenance program, 2003**
2. **Improvement of ISI for NPP, 2004**

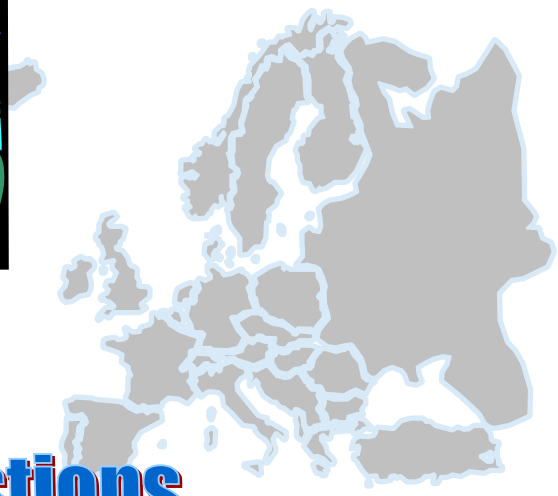
CRP: Verification of WWER SG tube integrity

2001: started

2004: to completed

4.2 Regular Budget: Plan for 2004-2005 cycle

1. **New CRP: Review of structural integrity assessment procedures**
2. **TECDOC: Strategy and tools on predictive maintenance and condition monitoring**
3. **2006-2007 cycle: to start planning soon**



Any questions

International Atomic Energy Agency

HUN/4/014

" **License Renewal of Paks Nuclear Power Plant Operation** "

and

ARM/9/012

" **Ageing Control at the Armenian NPP** "

EBP-SALTO
Steering Committee Meeting
Vienna, 16-18 March 2004

by A. Atger, TCEUS & P. Contri, NSNI

Overview

- Projects objective & background information
- National Commitment
- Agency Inputs
- Performance indicators
- Expected Results
- Projects Budget
- Tasks shared with the EBP-SALTO

Project Objective HUN/4/014

To develop an ageing management programme and to prepare the regulatory basis for a license renewal for the Paks Nuclear Power Plant (NPP) in the event its operation is extended beyond the designed plant lifetime.

Time frame: 2003-2006

Project Background HUN/4/014

- The operation of the plant at Paks NPP is planned to be extended beyond the designed plant lifetime. According to the Feasibility Study and Business Plan completed in 2000, the plant life extension by 20 years is technically feasible, economically sound, and safe, provided relevant safety requirements and standards are followed.
- A national programme for preparing the technical and regulatory basis for Paks NPP lifetime extension was launched in 2001. Its objectives are to assess the plant status, monitor ageing, and develop an ageing management programme by the end of 2005. It also includes review and modernization of in-service inspection and maintenance procedures, qualification of components, and their replacement when necessary. An integral part of the programme is the development of the regulatory basis for NPP lifetime management and lifetime extension licensing.

Project Background HUN/4/014

- The counterparts at the plant and regulatory authority have no practical experience with NPP life extensions, therefore Agency assistance and co-operation is required.
- The project was proposed for four years and is focussed on making use of existing international experience and good practice.
- Priorities at Paks were focused in 2003 to resolving the effects of the incident at Paks in order restarting the affected unit and reviewing the procedures etc.
- Agency received confirmation to Paks renewed commitment to license renewal and anticipate that this project would continue in the future

National Commitment HUN/4/014

National counterpart organizations will provide sources for the national programme, to which the Agency's project is complementary.

They will also provide premises and make personnel available for seminars, expert reviews, and missions carried out by the Agency at the Paks NPP sites and also at the Hungarian Atomic Energy Authority.

Agency Inputs HUN/4/014

- Expert review and advisory services
- Training, scientific visits, selected equipment for assessing aspects of component ageing, and;
- Assistance in design basis reconstitution

Performance indicators HUN/4/014

- Regulatory basis for NPP lifetime management and lifetime extension consistent with international standards and practices.
- Plant lifetime management programme consistent with international standards and practices.
- Current licensing basis documented.
- Optimised maintenance, surveillance, and in-service inspection programme prepared.
- Safety issues identified from comparisons with current safety standards and practices.
- Safety improvements to resolve identified safety issues approved and implemented.

Expected Results HUN/4/014

- The regulatory basis for license renewal/extension of Paks NPP operation and the ageing management programme of the plant will be developed in line with internationally accepted standards and practices.

Activities Performed in 2003 HUN/4/014

- Co-ordination Meeting at IAEA Hqs
- EM for the review of Paks NPP project work plan and scope (5 IEX 09 March-14 March 2003)
- SVs to US-NRC and Arkansas Nuclear One Power Plant/Washington & Russelville (5 NEX 16-20 June 2003)

(IEX: International Experts, EM: Expert Mission, SV: Scientific Visit NEX: National Experts)

Project Budget HUN/4/014

License Renewal of Paks Nuclear Power Plant Operation (HUN/4/014) A1 Continuation
(See GOV/2003/72 & GOV/2003/72/Add.1 dated October 2003)

CORE FINANCING

YEAR	Human Resource Components (US $)						Procurement Components (US $)				TOTAL
	Experts	Meetings/ Workshop	Fellow-ships	Scientific Visits	Group Training	**Sub-Total**	Equipment	Sub-Contracts	Misc. Comp.	**Sub-Total**	(US $)
2004	16 280	0	0	0	0	**16 280**	0	0	0	**0**	**16 280**
2005	27 000	0	0	0	0	**27 000**	5 000	0	0	**5 000**	**32 000**
2006	27 600	0	0	0	0	**27 600**	5 000	0	0	**5 000**	**32 600**

FOOTNOTE-a/ FINANCING

YEAR	Human Resource Components (US $)						Procurement Components (US $)				TOTAL
	Experts	Meetings/ Workshop	Fellow-ships	Scientific Visits	Group Training	**Sub-Total**	Equipment	Sub-Contracts	Misc. Comp.	**Sub-Total**	(US $)
2004	13 200	0	0	0	0	**13 200**	65 000	8 000	0	**73 000**	**86 200**
2005	13 500	0	0	0	0	**13 500**	65 000	7 000	0	**72 000**	**85 500**
2006	13 800	0	0	0	0	**13 800**	65 000	6 000	0	**71 000**	**84 800**

First Year Approved: 2003 Total expenditure to 01 October 2003: $14 422 (TCF)
$6 014 (EXTRA)
$20 436 (TOTAL)

Tasks shared with the EBP-SALTO – HUN/4/014

1) Tasks shared with the EBP-SALTO**, in the scope of the TC project:**

- **Recovery of regulatory and operational experience from other WWER countries**
- **Development of a state-of-the-art approach to LTO, consistent with IAEA safety requirements and guidelines**

2) Tasks in the scope of the national TC project**, as they cannot be shared with EBP-SALTO:**

- **National training by IAEA experts (WS and fellowships)**
- **Review of regulatory documents**
- **Review of safety related issues as part of the "preconditions to LTO"**
- **Review of both safety-related and non-safety-related aspects of the program: material degradation and trend, staff ageing, technological obsolescence, environmental issues, legal aspects, economic aspects, etc.**

Project Objective ARM/9/012

- To support the Armenian Nuclear Regulatory Authority (ANRA) in the development of an Safety requirement for an Ageing Management Programme (AMP) at the Armenian Nuclear Power Plant (ANPP).
- To support the ANPP in the implementation of a state-of-the-art AMP

Time frame: 2002 – 2003 (today, only the final AMAT is missing)
Budget (core funding): US$ 75,000

Agency Inputs ARM/9/012

- Training ANRA staff for development of the Ageing Management Requirements through a national workshop and expert missions;
- Training and review missions for ANPP staff aimed at optimal integration of all relevant safety-related tasks in the AMP
- Two fellowships for training focused on modification of the existing procedures and their incorporation into the AMP framework; and a complete workstation, equipped with state-of-the-art software for the implementation of a database for ageing management.

Expected Results ARM/9/012

- An AMP will be developed which will enhance the capability of the ANPP to evaluate damage mechanisms and therefore prevent potential ageing-induced failures

Tasks shared with the EBP-SALTO – ARM/9/012

1) Tasks shared with the EBP-SALTO**, in the scope of the TC project:**

- **Recovery of regulatory and operational experience from other WWER countries (only through the project outcome as Armenia is not part of the SALTO)**
- **Sharing of experience in AMP management and degradation mechanism detection and mitigation (only through the project outcome as Armenia is not part of the SALTO)**

2) Tasks in the scope of the national TC project**, as they cannot be shared with EBP-SALTO:**

- **National training by IAEA experts (WS and fellowships)**
- **Procurement of data base shell and hardware**
- **Review of regulatory documents**
- **AMAT review of the AMP at the plant**

International Atomic Energy Agency

EBP-SALTO
Steering Committee Meeting
16-18 March 2004

Information on other IAEA related activities In Armenia and Hungary under TC funding

by P.Contri (NSNI/ESS/DU)
P.Contri@IAEA.org

TC project HUN/4/014

Title: License renewal of Paks NPP Operation

Objectives:

- Contribute to the development of the plant life management program transferring the best international practice and experience
- Review the implementation of the program
- Review the national regulation and guidelines
- Get support from the IAEA for public acceptance

Time frame: 2003 – 2005 (only kick-off tasks implemented)

Counterparts: NPP AND Reg. Body

Achievements:

- Training
- Preliminary review of the workplan
- Preliminary assessment of the “preconditions” for LTO: SAR, safety issues, etc.

HUN/4/014 versus EBP-SALTO

1) **Tasks shared with the EBP-SALTO**, in the scope of the TC project:
- Recovery of regulatory and operational experience from other WWER countries
- Development of a state-of-the-art approach to LTO, consistent with IAEA safety requirements and guidelines

2) **Tasks in the scope of the national TC project**, as they cannot be shared with EBP-SALTO:
- National training by IAEA experts (WS and fellowships)
- Review of regulatory documents
- Review of safety related issues as part of the ”preconditions to LTO”
- Review of both safety-related and non-safety-related aspects of the program: material degradation and trend, staff ageing, technological obsolescence, environmental issues, legal aspects, economic aspects, etc.

TC project ARM/9/012

Title: Ageing control at the Armenian NPP

Objectives:
- To support the Reg. Body in the development of safety requirement for an AMP at the ANPP
- To support the ANPP in the implementation of a state-of-the-art AMP

Time frame: 2002 – 2003 (today, only the final AMAT is missing)

Counterparts: NPP AND Reg. Body

Achievements:
- Training
- Review of the regulatory requirements
- Preliminary review of the AMP at the plant
- Procurement of codes and data bases suitable for AMP management

ARM/9/012 versus EBP-SALTO

1) **Tasks shared with the EBP-SALTO**, in the scope of the TC project:
   - Recovery of regulatory and operational experience from other WWER countries (only through the project outcome as Armenia is not part of the SALTO)
   - Sharing of experience in AMP management and degradation mechanism detection and mitigation (only through the project outcome as Armenia is not part of the SALTO)

2) **Tasks in the scope of the national TC project**, as they cannot be shared with EBP-SALTO:
   - National training by IAEA experts (WS and fellowships)
   - Procurement of data base shell and hardware
   - Review of regulatory documents
   - AMAT review of the AMP at the plant

Recent Activities Related to Ageing Management and Long Term Operation Safety of NPP at NSNI, IAEA

2nd Steering Committee Meeting of EBP on Safety Aspects of Long Term Operation of Pressurized Water Reactors, Vienna, 16-18 March 2004

Takehiko Saito
Engineering Safety Section
Department of Nuclear Safety and Security, IAEA

REGULAR BUDGET ACTIVITIES

1. SAFETY KNOWLEDGE BASE

- Modification of knowledge base structure
  - Standard IAEA Safety Knowledge Base structure
  - Expansion of scope (non-physical ageing)
- Addition to the knowledge base
  - Non-physical ageing guidance documents
  - International Practices (EU, OECD/NEA) & National Regulations (USA)
  - Workshop Materials and Related Mission & Meeting Reports

2. ISSUE AND PREPARATION OF NEW DOCUMENTS

- Issue of new TECDOC, TECDOC-1361, Assessment and management of ageing of major nuclear plant components important to safety: Primary piping in PWRs
- Finalization of draft TECDOCs for BWR RPV and Internals Ageing Management (CSs & TM)
- Revision of TECDOCS for PWR RPV and Internals Ageing Management (CS)

TC Projects

- License renewal of Paks NPP operations, HUN/4/014, Hungary, 2003-2006
- NPP lifetime management in Ukraine, UKR/4/013, 2003-2006 (See Attachment)
- Development of a regulatory basis for NPP license / renewal of NPP operation, RUS/9/003, Russia, 2001-2004* *tentative
- WWER Design Basis Documentation Management, RER/9/069 Regional Europe

Sub-activities of projects (Workshops)

- Regional workshop on safety aspects in life extension for NPPs, RER/9/070, Slovakia, May 2003
- Workshop on configuration management, RER/4/025, Hungary, June 2003
- Workshop on Life Extension, RUS/9/003, Kola NPP, September 2003
- National workshop on management of ageing, RAS/4/021, China, December 2003

EBP Projects

- Safety aspects of long term operation of PWRs (This project), 2003-2007
- EBP-Asia
  - WWER's horizontal SG tubing and primary composite material pipe examination technology, China, November 2003
  - Management and assessment of the steam generator lifetime, China, April 2004

TC Project for Ukraine: UKR/4/013 1/3

Title	**Action Plans for Power Plant Lifetime Management**
Counterpart	Ministry of Fuel and Energy (MFE) and State Nuclear Regulatory Committee of Ukraine (SNRCU)
Objectives	To elaborate a strategy and action plan for lifetime management for all NPPs in Ukraine
Start of project	2003
Tasks	▪ To review and advise on the General Obligations Document for License Renewal ▪ To review and advice on the overall programme for presentation of License Renewal in Ukraine ▪ To advise national Strategy for NPP Licence Renewal in Ukraine
Progress of the project	▪ 2 expert missions to review and advise on related Ukrainian documents were carried out in 2003. ▪ 3 more missions in 2004 are planned ▪ Planning of overall programme of the project for 2004 and 2005 are completed.

Progress of TC Project UKR/4/013 in 2003

2/3

No	Type	Description	Location	Status
1	NC	**Basic information exchange**	Vienna	April 2003
2	EQ	**Procurement of IAEA Document**	Vienna	May 2003
3	EM	**Review of current status and advice on draft strategy & work programme**	Kiev	July 2003
4	NC	**Participation in a Workshop on Life Extension at Kola NPP (RUS/9/003)**	Kola NPP	Sep 2003
5	CS	**Preparation of a report on role of TSOs**	Home	Sep/Oct 2003
6	CS	**Review of General Obligations document of SNRCU and related documents**	Home	Sep/Oct 2003
7	CS	**Review of overall programme for preparation for License Renewal**	Home	Sep/Oct 2003
8	WS	**Seminar/workshop on ageing management**	Rovno	October 2003
9	SV	Scientific visits: 1 Ageing Management	TBD	Postponed
10	SV	Scientific visits, 2 PSR Requirements and objectives	TBD, Regulator	Postponed
11	SV	Scientific Visit, 3 PSR Development	TBD, Utility	Postponed
11a	SV	Scientific visit, 3a Mechanical strength analysis	TBD	Postponed
12	SV	Scientific Visit, 4 License renewal process	TBD	Postponed
13	EM	**Review of: General Obligations Doc., Discussion of Role of Periodic Safety Review, Discussion of Regulatory Framework, needs and required submission dates**	Kiev	Nov 2003
14	TM	**Review of progress of TC Project UKR/4/013, Review Ukraine progress**	Kiev	Nov 2003

Activities of TC Project UKR/4/013 in 2004

3/3

No	Type	Description	Location	Date
1	EQ	**Procurement of OECD/NEA Documents: "Regulatory Aspects of Life Extension and Upgrading of NPPs", 2001 and "Glossary of NPP Ageing", 1999**	-	Jan
1a	EM	**Follow-up expert mission on lifetime extension of WWERs: Slovak practice**	Kiev	Feb
2	WS	**Workshop on design basis data and ageing management of RPV for WWER440-213**	Russia	2Q
3	EM	**Expert mission to help establish Regulatory Documents for Life Extension in Ukraine (Review of the revised General Obligations Document of SNRCU)**	Kiev	2Q
4	EM	**Expert review of model AMP drafted by Energoatom**	SU NPP	2Q
5	SV/NC	**License renewal**	European regulator	3Q
6	EQ/ TC	**(Procurement of test books / Training course) Methodology for systematic project design and development**	Kiev	3Q
7	SV/NC	**Ageing management**	European utility	4Q
8	TM	**Review of TC project and Ukraine progress / planning for 2005**	Vienna IAEA	4Q

TC Project for Ukraine: UKR/4/013 1/3

Title	**Action Plans for Power Plant Lifetime Management**
Counterpart	**Ministry of Fuel and Energy (MFE) and State Nuclear Regulatory Committee of Ukraine (SNRCU)**
Objectives	**To elaborate a strategy and action plan for lifetime management for all NPPs in Ukraine**
Start of project	**2003**
Tasks	▪ **To review and advise on the General Obligations Document for License Renewal** ▪ **To review and advice on the overall programme for presentation of License Renewal in Ukraine** ▪ **To advise national Strategy for NPP Licence Renewal in Ukraine**
Progress of the project	▪ **2 expert missions to review and advise on related Ukrainian documents were carried out in 2003.** ▪ **3 more missions in 2004 are planned** ▪ **Planning of overall programme of the project for 2004 and 2005 are completed.**

International Atomic Energy Agency

Progress of TC Project UKR/4/013 in 2003 2/3

No	Type	Description	Location	Status
1	NC	**Basic information exchange**	Vienna	April 2003
2	EQ	**Procurement of IAEA Document**	Vienna	May 2003
3	EM	**Review of current status and advice on draft strategy & work programme**	Kiev	July 2003
4	NC	**Participation in a Workshop on Life Extension at Kola NPP (RUS/9/003)**	Kola NPP	Sep 2003
5	CS	**Preparation of a report on role of TSOs**	Home	Sep/Oct 2003
6	CS	**Review of General Obligations document of SNRCU and related documents**	Home	Sep/Oct 2003
7	CS	**Review of overall programme for preparation for License Renewal**	Home	Sep/Oct 2003
8	WS	**Seminar/workshop on ageing management**	Rovno	October 2003
9	SV	**Scientific visits: 1 Ageing Management**	TBD	Postponed
10	SV	**Scientific visits, 2 PSR Requirements and objectives**	TBD, Regulator	Postponed
11	SV	**Scientific Visit, 3 PSR Development**	TBD, Utility	Postponed
11a	SV	**Scientific visit, 3a Mechanical strength analysis**	TBD	Postponed
12	SV	**Scientific Visit, 4 License renewal process**	TBD	Postponed
13	EM	**Review of: General Obligations Doc., Discussion of Role of Periodic Safety Review, Discussion of Regulatory Framework, needs and required submission dates**	Kiev	Nov 2003
14	TM	**Review of progress of TC Project UKR/4/013, Review Ukraine progress**	Kiev	Nov 2003

International Atomic Energy Agency

Activities of TC Project UKR/4/013 in 2004

3/3

No	Type	Description	Location	Date
1	EQ	**Procurement of OECD/NEA Documents: "Regulatory Aspects of Life Extension and Upgrading of NPPs", 2001 and "Glossary of NPP Ageing", 1999**	-	Jan
1a	EM	**Follow-up expert mission on lifetime extension of WWERs: Slovak practice**	Kiev	Feb
2	WS	**Workshop on design basis data and ageing management of RPV for WWER440-213**	Russia	2Q
3	EM	**Expert mission to help establish Regulatory Documents for Life Extension in Ukraine (Review of the revised General Obligations Document of SNRCU)**	Kiev	2Q
4	EM	**Expert review of model AMP drafted by Energoatom**	SU NPP	2Q
5	SV/NC	**License renewal**	European regulator	3Q
6	EQ/ TC	**(Procurement of test books / Training course) Methodology for systematic project design and development**	Kiev	3Q
7	SV/NC	**Ageing management**	European utility	4Q
8	TM	**Review of TC project and Ukraine progress / planning for 2005**	Vienna IAEA	4Q

International Atomic Energy Agency

National Technical Cooperation Project RUS/9/002 "Safety Review of Nuclear Power Plants"

2000 - 2004

TC Project Officer: Jan Stuller
Technical Officer: Alexander Toth, NSNI/OSS

1

Topics covered by RUS/9/002

- Utilization and application of operational safety assessment methodology – 6 carried-out /0 planned in 2004
- Development and implementation of engineering assessment of safety systems – 5/3
- Annual review of current status of operational safety of NPP – 3/1
- Safety culture – 1/1
- Implementation of effective quality assurance programme – 2/0
- Participation of Russian experts in missions and meetings – continuing
- Other activities – 3/2

2 International Atomic Energy Agency

Activities planned in 2004

- Course to support corporate oversight inspectors on methodology, Moscow, 30 March - 1 April
- Current experience with assessment of event precursors as part of OE process, Event analysis methodologies, Moscow, 26-30 April
- Specific topics of practices of PSA applications at NPPs, Moscow, 1-4 June
- Engineering assessment methodology through application to selected safety systems, NPP, 3-4 Q
- Scientific visit of Russian experts, EDF, France
- Challenges of units operation beyond design lifetime, NPP, 3-4 Q
- Advanced methods of assessment and self-assessment of Safety Culture, 3-4 Q

IAEA TC Project RUS/9/003
on
DEVELOPMENT OF A REGULATORY BASIS FOR NPP LICENCE RENEWAL/EXTENSION OF NPP OPERATION

EBP SALTO PWR, 2ND SC MEETING
IAEA, Vienna, 16-18 March 2004
Radim Havel

Objective and approach

- Objective: Assist in developing regulatory basis
- Activities:
  - Experts' services
  - Workshops
  - Scientific visits

Results

- 6 reg. docs developed:
  - Basic requirements for nuclear power plant unit lifetime extension, NP-017-2000.
  - Requirements for the composition and contents of the set of documents substantiating safety in the period of extra operating time of a nuclear power plant unit, RD-04-31-2001.
  - The analysis of the operational experience of a NPP unit for the justification of safety when extending its operational life, RB-xxx-02.
  - The analysis of non-compliance of a nuclear power plant unit to the requirements of normative documents in effect, RB-xxx-2002.
  - Requirements for the composition and contents of the set of documents on overall plant inspection
  - Service life management of nuclear power plant components.

Results cont'd

- Workshops
  - Practice in the renewal of licenses for NPP operation, Moscow, 2001
  - Exchange of experience on implementation of regulatory basis on licence renewal in Russia, Kola NPP, 2003
- Scientific visits
- Participation in int. activities (Mtgs, Confs)

Plans

- Workshop:
  - Analysis of results of implementation of developed regulatory basis

Working Group 1 (WG 1)
Long term operation of PWRs

P. T. Kuo, Program Director
License Renewal and Environmental Impacts
U. S. Nuclear Regulatory Commission
IAEA EBP Working Group 1
March 16-18, 2004

Background

- Working Group 1 (WG-1) meeting on January 13-15, 2004
- 16 Participants representing 8 member states, European Commission, and IAEA
- Meeting Objectives – to finalize the WG-1 work plan and standard review process

2

National Presentations

- Presentation by all eight MS
- Pre-conditions required for long term operations

3

Work Plan Objectives

- Identify pre-conditions for long term operation (LTO)
- Review regulatory approaches in participating MS
- Consensus on approach: Deterministic & Probabilistic
- Identify baseline for LTO
- Identify attributes of acceptable aging management programs
- Establish Guidance for approach to LTO
- Recognize future challenges

4

Scope for LTO

- Scope of Systems Structures, and Components (SSC) into 3 categories
  - Safety-related SSCs (pressure boundary, safe shutdown & mitigating systems)
  - Non-safety related SSCs (protect above functions)
  - Events that reduce plant core damage frequency (CDF) (Fire Protection, PTS)

5

WG-1 Tasks

- Task 1- Collect information on Regulations, guidance and practices related to LTO
- Task 2- Review, compare and evaluate information collected under task 1
- Task 3- Reconcile differences and reach consensus
- Task 4 - Prepare WG-1 Final report

6

Milestones and Deliverables

	Start	Meeting	Finish
Task 1	04-01-13	04-01-13	04-05-13
Task 2	04-06-01	04-08-13	04-11-30
Task 3	04-12-01	05-01-25	05-05-31
Task 4	05-08-29	05-08-29	06-05-31

7

Working Group 2 : *Mechanical Components and Materials* **Workplan**

V.Piminov

Second Steering Committee Meeting of EBP SALTO, IAEA, Vienna, 16-18 March 2004

History of Workplan development

- The first draft - July 2003
- Preliminary discussion and correction (through E-mail) between WG leaders and secretaries (July 2003)
- Discussion and harmonizing of WG 1-4 workplans during Planning Meeting (WG leaders and secretaries) 11-14 August 2003
- Consideration and finalization during the first (kick-off) meeting of WG-2 (4-6 February 2004)

Working Group 2 Objective

- The objective of Working Group 2 on Mechanical Components and Materials is to develop tools to support the identification of safety criteria and practices for the area of Mechanical Components and Material associated with the Long Term Operation (LTO) of pressurized water reactors (PWRs and WWER). Providing such tools will assist regulators and operators of NPPs in ensuring that the required safety level of their plants is maintained during LTO.

SCOPE (Systems, Structures, and (SSC) relevant to LTO) : (1)

1. **All safety related systems, structures, and components that are important to the fundamental safety functions:**

- **The control of the reactivity;**
- **The removal of heat from the fuel;**
- **The confinement of radioactive materials and control of operational discharges, as well as limitation of accidental releases.**

SCOPE (SSC relevant to LTO) : (2)

2. All non-safety related systems, structures, and components whose failure could prevent the satisfactory accomplishment of, or initiate challenges to, any of the safety functions defined above.

SALTO EBP, SC Meeting, Vienna, IAEA, 16-18/03/2004

SCOPE (SSC relevant to LTO) : (3)

3. SSC that are important to ensure a specific functional purpose that may be essential to safe LTO of the plant, such as:

- **fire protection,**
- **environmental qualification,**
- **pressurized thermal shock,**
- **anticipated transients without scram,**
- **severe accident management,**
- **station blackout**

Specific items for WG-2 activities:

- Piping
- Pumps, both the active portion and the passive vessel
- Valves, both the active portion and the passive vessel
- Vessels
- Vessel Internals
- Emergency Diesels
- Attachments, such as integrally welded supports, that may affect the integrity of a pressure boundary
- Heat Exchangers
- Support structures for piping, vessels and equipment including snubbers and viscoelastic dampers

SALTO EBP, SC Meeting, Vienna, IAEA, 16-18/03/2004

Tasks

- **Task 1**

Collect information on existing research, regulatory and operational approaches, programs, and practices related to mechanical components and materials essential to safe LTO of PWRs.

- **Task 2**

Review and compare existing regulatory and operational approaches and practices to identify common elements.

- **Task 3**

Develop recommendations and guidelines for inclusion in the draft report to the Steering Committee (SC)

Task 1: Collect Member State Information (1)

Milestones

1. Complete Draft of Standard Review Process
2. Finalize & Submit to Steering Committee Standard Review Process for Working Group 2
3. Complete Information Collection

Deliverables

1. Report outlining the Standard Review Process developed for Working Group 2
2. National summary reports for each participating MS

SALTO EBP, SC Meeting, Vienna, IAEA, 16-18/03/2004

Task 1: Collect Member State Information (2)

Procedure of collecting information

- During the Programme Planning Meeting (August 2003) it was decided to develop Standard Review Process (SRP). The objectives of this SRP are to:
  - ensure a well defined, uniformly structured and comprehensive approach to the collection of information and review processes;
  - facilitate communication among the Programme participants;
  - define a scope of activities that clearly identifies the specific elements of LTO that this Programme addresses
- **Each participating country/WG member is requested to prepare a "National Report" containing the information on Task 1.**

Task 1: Collect Member State Information (3)

Procedure of collecting information

- The drafts of "National Reports" will be considered and discussed during WG-2 Meetings
- Content of National Reports should be:
  - Uniform for all participating countries
  - Consistent to SRP
  - Providing similar level of details
- "Pilot" draft of National Report (USA) will be prepared and distributed by 30 March 2004. It will serve as a template for other participating MS (structure, content, level of details, …)

Task 1: Collect Member State Information (4)

WG-2. REQUIRED INFORMATION (acc. to SRP)

- The process used in developing the scope of systems, structures and components (SSCs) that are subject to the long term operation (LTO) review.
- Design basis information verified by configuration management (*The intent is not to collect Design Basis information but rather to verify that the Design Basis is properly controlled through Configuration Management*)
- In-service inspection practices for passive components, including any augmented inspection programs that address issues such as erosion/corrosion, augmented inspection of steam generator tubing or augmented inspection for specific degradation mechanisms such as intergranular stress corrosion cracking.

Task 1: Collect Member State Information (5)

WG-2. REQUIRED INFORMATION (cont.)

- Condition monitoring
- Maintenance Codes or Practices for active components
- Applicable Aging Effects on Structure and Component Intended Function(s)
- Aging Management programs
- Plant-specific safety analyses which may have been based on an explicitly assumed plant life or operating period, number of cycles, cumulative load, etc.
- Component function tests
- Applied diagnostic systems
- Surveillance programmes

Task 1: Collect Member State Information (6)

WG-2. REQUIRED INFORMATION (cont.)

- Nondestructive material properties tests (hardness measurements etc.)
- Destructive tests and material research carried out during NPP operation
- Special loading measurement systems combined with damage calculation (e.g. fatigue monitoring)
- Chemical regimes monitoring
- Aging mitigation measures applied in NPP
- Information from applicable research projects
- Operational experience
- List of reference documents from which the above information was collected

Task 2: Assess Member State Information (1)

Milestones

1. Complete Initial Analysis of Information and identify needed additional information
2. Identify additional information needed to complete assessment of the technical basis for MS requirements, processes and practices relating to LTO
3. Complete Draft Report that outlines common practices and differences among national requirements, processes and practices relating to long term operation
4. Finalize the Draft Report

Deliverables

1. Report that describes the results of the assessment and analysis of national summary reports

Task 2: Assess Member State Information (2)

General procedure

- Each WG member will review all National Reports

  Aim: To determine common aspects, as well as differences between applicable laws and regulatory requirements, approaches, processes and practices; research; outstanding technical and programmatic issues to be resolved, and operational experience
- Each WG member will prepare and distribute his findings to the other WG members
- Integrated review results will be drafted by WG Chairman and Secretary, discussed and reconciled with WG members

Task 3: Complete Final WG-2 Report to S C

Milestones

1. Complete Draft Report from Working Group 2
2. Resolve Steering Committee comments
3. Finalize Report that identifies safety criteria and practices for mechanical components and material issues among MS

Deliverables

1. Final Report
2. WG 2 input to the SG final report (in co-ordination with the other WGs)

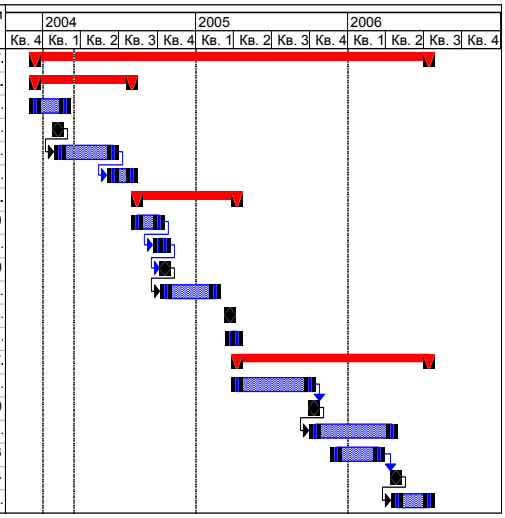
SALTO EBP, SC Meeting, Vienna, IAEA, 16-18/03/2004

Content of WG-2 Final Report

- Summary of the applicable laws, regulatory requirements and operational approaches to regulating and managing the LTO of the member states' pressurized water reactors.
- Definition of the differences between the applicable laws, regulatory requirements and operational approaches among the member states participating in the Programme
- Identification of potential safety issues where additional regulatory and/or operational development may be needed. This section of the report will also identify unresolved safety issues and future challenges that need to be resolved.
- Recommendations from the working group for resolving the unresolved safety issues.

WG-2 Time Schedule (current)

Ид.	Task Name	Начало	Окончани
35	**WG 2 Mechanical/Materials**	**Пт 12.12.**	**Вт 11.07.**
36	**Task 1**	**Пт 12.12.**	**Пт 30.07.**
37	Final Draft SRP&WP	Пт 12.12.	Пт 20.02.
38	Kick-off Mtg	Ср 04.02	Пт 06.02.
39	Coll Info&Draft T1 Rpt	Пн 09.02	Вт 15.06.
40	Final T1 Rpt	Ср 16.06	Пт 30.07.
41	**Task 2**	**Пт 13.08.**	**Чт 07.04.**
42	Init.anal.of info	Пт 13.08.	Пн 04.10
43	Outline for T2 Rpt	Вт 05.10.	Вс 17.10.
44	Review Mtg 1	Пн 18.10	Ср 20.10
45	Draft T2 Rpt	Чт 21.10.	Вт 15.02.
46	Review Mtg 2	Ср 23.03	Пт 25.03.
47	Final T2 Rpt	Пт 25.03.	Чт 07.04.
48	**Task 3**	**Пт 08.04.**	**Вт 11.07.**
49	WG 2 Draft Final Rpt	Пт 08.04.	Пт 30.09.
50	WG 2 Final Rpt Mtg	Пн 10.10	Ср 12.10
51	WG 2 Final Rpt	Чт 13.10.	Пт 14.04.
52	Draft WG 2 SC Rpt	Чт 01.12.	Пн 13.03
53	WG 2 SC Rep Mtg	Пн 24.04	Ср 26.04
54	Final WG 2 SC Rpt	Чт 27.04.	Вт 11.07.



Anticipated Meetings of WG 2 (1)

Task 1.0

- **Kick-off and Data collection meeting** **4-6/02/04**
  - Data collection (initiation)
  - Finalization of the Workplan
  - SRP (detailisation for WG-2)

Task 2.0

- **Review meeting 1** **18-20/10/04**
  - Identification of needed additional information
- **Review meeting 2** **23-25/03/05**
  - Finalization of the report on Task 2

Anticipated Meetings of WG 2 (2)

Task 3.0

- **WG-2 Final Report meeting** **10-12/10/05**
  - Discussion of Draft of Final Report
  - Resolving SC comments to the Final Report

Outstanding issues

- **Uniform understanding of the content of the National Reports by all WG members (structure, level of details, …)**

  Way of solution – "Pilot National Report" (preparation, distribution among WG members, consideration and commenting)
- **Interface with WG-4 concerning the scope of components**
- **Information from MS countries not represented in WG-2**
- **Financial support for information collection process should be provided by participating states**
  - **All needed information can not be collected by WG members only. Additional national experts have to be involved.**

EXTRABUDGETARY PROGRAMME SAFETY ASPECTS OF LONG-TERM OPERATION OF PRESSURIZED WATER REACTORS

WORKING GROUP 4 – STRUCTURES

Tamas Katonas, Co-Chairman
Mihail Batishchev, Co-Chairman
William Burton, Secretary

1

KICK-OFF MEETING

- 3 March – 5 March, 2004 in Vienna
- 15 Participants from 8 Member States and EC
- Purpose
  - Review and Finalize WorkPlan (WP) and Standard Review Plan (SRP)
  - Initiate WG 4 Activities
  - Review and Finalize Work Schedule

2

NATIONAL PRESENTATIONS

- Major Presentation Topics
  - Key Structures and Structural Components
  - National Laws and Regulatory Standards
  - Key Aging Mechanisms, Effects, Management Activities, and Programs
  - Operating Experience

3

NATIONAL PRESENTATIONS

- Plans to Assess Adequacy of Structures for LTO
- Research Activities
- Issues for Consideration By The Steering Committee

4

REVIEW OF WORKPLAN (IAEA-EBP-LTO-02)

- Key Revisions
  - Revised Safety-Related Functions
  - Revised List of Functional Areas Related to Structures
  - Additional Structural Components and Key Interfaces
  - Developed Approach to Address Conflicts
  - Coordination Issues With Other WGs

5

REVIEW OF WORKPLAN (IAEA-EBP-LTO-02)

- Revisions to Tasks
  - Task 1
    - Consider Additional Reactor Types (BWRs and RBMKs)
    - Minor Change to Task 1 Deliverables
  - Task 2
    - Review Method (Separation of Responsibilities)

6

REVIEW OF WORKPLAN (IAEA-EBP-LTO-02)

- Schedule Revisions
  - Task 1 Report: 31 December, 2004
  - Task 2 Report: 30 September, 2005
  - Task 3 Report: 28 February, 2006
  - Final SC Report: 30 June, 2006

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REVIEW OF STANDARD REVIEW PLAN (IAEA-EBP-LTO-03)

- Scope of Review
  - Deleted Wording Relating PSR to LTO
  - Revised Format and Content of Task 1 Report
  - Revised Appendix I (PSR Safety Factor Table)
  - Revised Section 5 of Appendix II (Information Report Outline)

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OTHER WORKING GROUP ACTIVITIES

- Work Methods
  - Suggested Time for Document Review (5 Days)
  - Alternatives to Internet Use
  - Next Meeting

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NEXT STEPS

- Next Meeting: December, 2004 – Location TBD
  - Final Review of National Reports
  - Finalize Task 1 Report
  - Plan Task 2 Activities
  - Other Issues, As Needed

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ISSUES FOR CONSIDERATION BY THE STEERING COMMITTEE

- Design Basis Information
- Configuration Management
- Expanded Scope of Programme
- Working Group Coordination
- Relevance of PSR
- Website

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