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

MINUTES OF THE PROGRAMME'S PLANNING MEETING

11-14 August 2003
IAEA, Vienna, Austria

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 licence 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 pressurized water reactors'. The Programme's objectives are to assist those Member States (MS) considering LTO of pressurized water reactors to establish a general LTO framework and, to provide a forum in which MS can freely exchange information. The Programme should assist regulators and operators of PWRs and, in particular WWERs, in ensuring that the required safety level of their plants is maintained during long term operation and should provide generic tools to support the identification of safety criteria and practices at the national level applicable to LTO.

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;
- mechanical components and materials;
- electrical components and I&C;
- structures and structural components.

The purpose of the Planning Meeting was to develop detailed Workplans, Appendix I., and Programme schedule, Appendix II., for each of the 4 WGs in line with the Programme SC recommendations [1]. Nominated WG Chairmen and Secretaries participated in the Planning Meeting in order to promote communication, co-ordination, and to facilitate coherent reporting among WGs.

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

The SC Chairman and IAEA staff who will be involved in the Programme activities also attended the Meeting. The list of participants is provided in Appendix IV.

2. MEETING SUMMARY

The meeting was opened by Radim Havel, the Programme Scientific Secretary, who outlined the meeting objectives and deliverables. Frank Gillespie, the Programme SC Chairman, continued the meeting by inviting everyone to solve a common problem encountered by both the regulators and operators in many countries and outlined to the meeting participants the SC vision on the Programme objectives, scope, approach and deliverables.

The meeting continued by presentation and discussion of the draft Workplans prepared in advanced by the WG Chairmen/Secretaries. After several rounds of revisions and discussions in plenary the final draft Workplans and final draft Programme schedule were agreed upon, Appendix I. and II.

It should be noted that the Workplans do not take into account the limited financial resources available for the implementation of the Programme at present and are focused on meeting the technical expectations of participating MS [1]. It is assumed that sufficient financial resources will be made available (voluntary contributions of participating MS) to facilitate the Programme implementation covering the whole proposed scope and producing the expected deliverables.

It was also agreed, that all 4 WGs will follow in their work a common "Standard review process" (SRP) to facilitate communication and coherent reporting. Tom Taylor and Tomy Nazario volunteered to prepare the first draft SRP, which will be than adjusted by each WG to accommodate the specific needs and after approval by the SC used in the WGs efforts. The systematic use of the SRP will also reduce the need for translation of various national "source" reports.

Overall communication and in particular establishment of the Programme web pages was also discussed. The SC recommendation on presentation of the finalized Programme results using an open access web pages and password protected web pages for not finalized reports and supporting documents were adopted without any additional comments and recommendations (in this sense finalized Programme results are reports finalized by respective WG and approved by the SC).

Excellent co-operation and preparatory work allowed completion of the Workplans during the meeting and it was concluded that the second meeting of the group tentatively planned for October 2003 is not needed. Further, it was agreed that, if the SC would approve the developed Workplans and Programme schedule, the IAEA should explore the possibility to initiate the WG activities prior to the next SC meeting. This would allow the SC to review, discuss, and approve the Workplans, Programme schedule and results of the WG kick-off meetings (these would include views of all WG members). To facilitate this, the 2nd SC meeting would need to be postponed for approximately March 2004.

3. ACTION ITEMS

1. Finalize the meeting Minutes including the developed Workplans and Programme schedule. Action: Radim Havel + all; 5 September 2003.
2. Submitt meeting Minutes to the SC for approval and request electronic approval by 30 September 2003 including approval of initiation of WG activities prior to the next SC and proposed change of the next SC dates (March 2004 instead of December 2003). Action: Radim Havel; 10 September 2003.
3. Prepare 1st draft generic "Standard review process", distribute to all WG Chairmen for comments, incorporate comments, and finalize. Action: Tom Taylor, Tomy Nazario; 15 September 2003.
4. Organize WG kick-off meetings in the period November 2003-January 2004 provideing SC approves draft Workplans and proposed Programme schedule. Action: Radim Havel + WG Chairmen; 31 October 2003.

5. Tailor draft generic “Standard review process” to each individual WG. Submit the draft (through the IAEA) to the SC for approval. Action: WG Chairmen; **DDMMYY** ?????

4. REFERENCES

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

APPENDIX I.
WORKPLANS FOR WORKING GROUPS 1 - 4

WORKING GROUP 1
on
GENERAL LTO FRAMEWORK

DRAFT WORKPLAN

1. BACKGROUND

Many of the operating nuclear power plants are approaching their design life. The operators are facing the choices of either decommissioning the plants or upgrading the plants for a longer operating life, providing that required safety can be maintained. Some Member States (MS) have already developed regulations and regulatory infrastructures for operations beyond the originally designed life, but many others have just started the development and/or planning. Currently, there is no international consensus on requirements for long term operation of nuclear power plants.

An internationally agreed common approach, including regulatory approaches, processes and practices, to support safe long term operation (LTO), which is not available today, needs to be developed. The IAEA has initiated this Extrabudgetary Programme (Programme) to reconcile the regulatory and operational aspects of pressurized water reactors, such as WWERs and PWRs, with regard to LTO. The intent of this Programme is to assist MS considering LTO of PWRs in establishing licensing frameworks, processes, and practices, and to promote exchange of information in these areas. The Programme will integrate existing best national practices that identify the necessary safety criteria, considering practical applications in the MS concerned. The combined experience of all MS participating in this Programme will be used as an input to developing a common approach to safe LTO.

While an international overall guidance on long term operation is not available today, a large body of documents on issues relevant to long term operation is readily available (IAEA, EC, NEA, and others). For example, the IAEA has prepared a draft Safety Guide DS 307, entitled "Periodic Safety Review of Nuclear Power Plants." This Safety Guide provides guidance on safety factors that have to be assessed periodically to ensure safe operation throughout the plant life, but it does not contain any explicit guidance for long term operation. These documents need to be systematically reviewed, compiled and consolidated into a user-friendly document that would provide MS with specific guidance for long term operation. The guidance document should ensure that major safety issues are addressed and lessons learned from MS are incorporated. The guidance document has to be a living document, which would be regularly updated with new lessons learned from all MS. Due to very different nature of laws and regulations in the MS, such guidance document may be supplemented by a country's own document that addresses the country's specific regulatory environment.

Decisions on LTO deal with a number of aspects for maintaining plant safety, in particular those related to managing the safety aspects of ageing of items important to safety. The IAEA has recognized the importance of safety aspects of nuclear power plant ageing in the eighties and initiated activities to increase the awareness of the emerging safety concern related to physical ageing of plant systems, structures and components (SSCs).

The work of this Programme is divided into four Working Groups (WG). Working Group 1 deals with the general aspects of long term operation. It identifies necessary pre-conditions and scoping criteria for Working Groups 2, 3, and 4. The Working Groups 2, 3, and 4

evaluate information for those structures, systems and components that are within the scope of long term operation.

2. OBJECTIVES

The objectives of WG 1 are to:

- Identify pre-conditions for LTO;
- Review regulatory approaches to LTO in participating MS;
- Reach a consensus on a regulatory approach and safety criteria for LTO on the basis of deterministic, probabilistic or a combination of deterministic and probabilistic analyses;
- Identify necessary information contained in design and safety basis documents to establish a baseline for LTO;
- Identify attributes of acceptable plant upgrading and aging management programmes for LTO;
- Discuss future challenges

3. SCOPE

Scope of activities for LTO should include the SSCs that fall in the following 3 categories:

1. All safety-related SSC that are important to the following functions:
- the integrity of the reactor coolant pressure boundary;
- the capability to shut down the reactor and maintain it in a safe shut down condition;
- the capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposure.

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

3. There may also be certain other areas dedicated to a specific functional purpose that may be essential to safe operation of the plant, such as:
- fire protection,
- environmental qualification,
- pressurized thermal shock,
- anticipated transients without scram,
- severe accident management and
- station blackout.

4. TASKS

Task 1
Each WG member will collect available information in the areas identified below. The WG will develop a standard review process to provide a consistent basis for collecting and comparing the information as well as reconciling identified differences to reach consensus.

1. Laws and regulations relevant to long term operation from each participating MS.
2. Current design basis requirements including any design codes used. In particular, maintenance practices, environmental qualification of electrical and mechanical

equipment, quality assurance practices, FSAR update, in-service inspection programmes, and time-limited aging analysis should be highlighted.
3. Any upgrading of design basis requirements performed during current operation.
4. Any considerations given to, or activities planned or taken for, long term operation.
5. Existing plant programmes that are directly related to LTO.
6. Available research results and operating experience that are directly related to LTO. Review DS 307 with respect to national approaches on LTO.
7. Compilation of a list of reference documents from which the above information was collected.
8. Document the collected information.

Collection of information for MS that are not represented on the WG will be coordinated through the Steering Committee.

Task 2
1. Review and compare the information collected under Task 1.
2. Evaluate and document the differences among the participating MS.

Task 3
1. Reconcile the differences and reach consensus among the Working Group members.
2. Document the consensus.
3. Identify the future challenges.

Task 4
1. Produce a Working Group 1 final report to the Programme SC.

5. MILESTONES AND DELIVERABLES

Task 1
Milestones
1. Develop standard review process.
2. Hold kickoff meeting.
3. Collect laws, regulations and practices relevant to long term operation.
4. Compile reference documents.
Deliverables
1. Task 1 report.

Task 2
Milestones
1. Complete review and comparison of information collected under Task 1.
2. Complete evaluation and documentation of identified differences.
Deliverables
1. Task 2 report.

Task 3
Milestones
1. Reconcile identified differences under Task 2.
2. Identify future challenges.
Deliverables
1. Task 3 report.

Task 4
Milestones
1. Complete WG draft report.
2. Complete WG final report to be submitted to the Steering Committee.
Deliverables
1. WG-1 final report.

6. CONDUCT OF WORKING GROUP ACTIVITIES

The working communication between the WG members is utmost important. The WG will use electronic communication as much as possible. A dedicated Programme web pages will be set up and managed by the IAEA and used both to present finalized information on the Programme (open access) as well as to facilitate exchange of working information among Programme participants (password protected access).

In order to accomplish the activities described in this Workplan the following expectations for members of Working Group are required:

- The number of WG meetings will be limited. Therefore much of the information and WG business will be conducted through email and it is expected that members will respond to email requests for input by the stated deadline.
- Each WG member will come to meetings fully prepared to conduct business and contribute to achieving the meeting objectives.
- Translation of large amount of documents is impractical. It is not expected that each WG member will review all the information. Therefore it is essential to follow the Standard Review Process to ensure the consistency between the reviewers.
- Technical disagrements are to be expected when conducting activities associated with this Workplan. When members disagree with any ideas or concepts it is required that the member offer a solution to resolve the issue.
- Members are expected to involve additional technical experts as necessary to complete WG business.
- At the end of each task, there will be task report and it is expected that the WG members provide input to the Chairman and Secretary in a timely manner.
- The working Group members should provide their input to the task report to the Chairman and Secretary at least one month prior to the milestone schedule indicated in the overall WG schedule.

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WORKING GROUP 2
on
MECHANICAL COMPONENTS AND MATERIALS

DRAFT WORKPLAN

1. BACKGROUND

Many of the operating nuclear power plants are approaching their design life. The operators are facing the choices of either decommissioning the plants or upgrading the plants for a longer operating life, providing that required safety can be maintained. Some Member States (MS) have already developed regulations and regulatory infrastructures for operations beyond the originally designed life, but many others have just started the development and/or planning. Currently, there is no international consensus on requirements for long term operation of nuclear power plants.

An internationally agreed common approach, including regulatory approaches, processes and practices, to support safe long term operation (LTO), which is not available today, needs to be developed. The IAEA has initiated this Extrabudgetary Programme (Programme) to reconcile the regulatory and operational aspects of pressurized water reactors, such as WWERs and PWRs, with regard to LTO. The intent of this Programme is to assist MS considering LTO of PWRs in establishing licensing frameworks, processes, and practices, and to promote exchange of information in these areas. The Programme will integrate existing best national practices that identify the necessary safety criteria, considering practical applications in the MS concerned. The combined experience of all MS participating in this Programme will be used as an input to developing a common approach to safe LTO.

While an international overall guidance on long term operation is not available today, a large body of documents on issues relevant to long term operation is readily available (IAEA, EC, NEA, and others). For example, the IAEA has prepared a draft Safety Guide DS 307, entitled "Periodic Safety Review of Nuclear Power Plants." This Safety Guide provides guidance on safety factors, which have to be assessed periodically to ensure safe operation throughout the plant life, but it does not contain any explicit guidance for long term operation. These documents need to be systematically reviewed, compiled and consolidated into a user-friendly document that would provide MS with specific guidance for long term operation. The guidance document should ensure that major safety issues are addressed and lessons learned from MS are incorporated. The guidance document has to be a living document, which would be regularly updated with new lessons learned from all MS. Due to very different nature of laws and regulations in the MS, such guidance document may be supplemented by a country's own document that addresses the country's specific regulatory environment.

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The work of this Programme is divided into four Working Groups (WG). Working Group 1 deals with the general aspects of long term operation. It identifies necessary pre-conditions and scoping criteria for Working Groups 2, 3, and 4. The Working Groups 2, 3, and 4

evaluate information for those structures, systems and components that are within the scope of long term operation.

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. Providing such tools will assist regulators and operators of NPPs in ensuring that the required safety level of their plants is maintained during LTO.

3. SCOPE

Working Group 2 should evaluate MS aging management processes and practices for the mechanical components and materials of SSC relevant to LTO that fall in the following 3 categories:

1. All safety related SSC that are important to the following functions:
- The integrity of the reactor coolant pressure boundary;
- The capability to shut down the reactor and maintain it in a safe shut down condition;
- The capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposure.

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

3. There may also be certain other areas dedicated to a specific functional purpose that may be essential to safe operation of the plant, such as:
- fire protection,
- environmental qualification,
- pressurized thermal shock,
- anticipated transients without scram,
- severe accident management,
- station blackout.

Specifically for the mechanical components and materials area this includes the following items:
- 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

Working Group 2 activities will specifically exclude the following systems, structures and components that will be covered by other Working Groups:
- containment/confinement structures including material such as concrete;

- support structures for piping, vessels and equipment including snubbers;
- spent fuel storage structure (except for mechanical components).

4. TASKS

Task 1
Collect information on existing research, regulatory and operational approaches, programmes, and practices related to mechanical components and materials essential to safe LTO of PWRs.

Each WG member will provide information related to the applicable laws and regulatory requirements; approaches, processes and practices; research; outstanding technical and programmatic issues; and operational experience, related to ageing and ageing management of mechanical components and materials essential to safe LTO of PWRs in their respective countries. This will include the identification of information sources. The WG will develop a standard review process (SRP) that facilitates a consistent and technically defensible review of MS requirements, approaches, processes, and practices. The SRP shall cover the following topics:

- MS process for classifying mechanical components into the categories described in section 3
- aging management for passive components (in-service inspection programs)
- aging management for active components (maintenance programs)
- process for incorporating plant operating experience (e.g. load history)
- research programs and other programs under development that are relevant to aging management issues

As part of this task, meetings may be held to reach agreement on the format and content of the final documentation. Collecting the necessary information from MS will require that several information collection meetings be held. After agreement on the format and content of the documentation, the information will be distributed to all the WG members in preparation for Task 2.

Collection of information for MS that are not represented on the WG will be coordinated through the Programme Steering Committee (SC).

Task 2
Review and compare existing regulatory and operational approaches and practices to identify common elements

Upon receipt of the information as provided in Task 1, WG members will review and compare the information from the MS 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, associated with the ageing and ageing management of mechanical components and materials essential to safe LTO of PWRs. As part of this task, meetings may be held to reach agreement on the format and content of the final documentation of the results of the individual reviews, as well as integrated review results. After agreement on the format and content of the documentation, each WG member will prepare and distribute its findings to the other WG members, and the integrated review results will also be distributed to the WG members in preparation for Task 3.

Task 3
Develop recommendations and guidelines for inclusion in the draft report to the Programme SC.

The objective of Task 3 is to complete a final report and submit the report to the SC for review and approval. The final report will address the following topics.

- One section of the report will summarize the applicable laws, regulatory requirements and operational approaches to regulating and managing the long term operation of the member states' pressurized water reactors.
- One section of the report will define the differences between the applicable laws, regulatory requirements and operational approaches among the member states participating in the Programme
- One section of the report will identify potential safety issues where additional regulatory and/or operational development may be needed. This section of the report will also identify any critical safety issues that need to be resolved.
- One section of the report will contain recommendations from the working group for resolving the most critical safety issues.

5. MILESTONES AND DELIVERABLES

Task 1. Collect Information on Mechanical Component and Material Issues
Milestones
1. Complete Draft of Standard Review Process
2. Finalize and submit to Steering Committee Standard Review Process for Working Group 2
3. Complete information collection meetings

Deliverables
1. Report outlining the Standard Review Process Developed for Working Group 2
2. Report(s) for each of the information collection meetings

Task 2. Assess and Analyze Member State Information
Milestones
1. Complete initial analysis of information collected from Task 1 and identify needed additional information
2. Identify additional information needed to complete assessment of the technical basis for member states requirements, processes and practices relating to long term operation
3. Complete draft report that outlines for member states requirements, processes and practices relating to long term operation
4. Finalize report on member states requirements, processes and practices relating to long term operation

Deliverable
1. Report that describes MS requirements, processes and practices relating to long term operation

Task 3. Complete Final Working Group Report to Steering Committee
Milestones
1. Complete draft report from Working Group 2
2. Resolve SC comments
3. Finalize report that defines the differences in managing the mechanical and material issues among MS.

Deliverables

1. Final Report that addresses the issues listed in Task 3 of Section 4 of this Workplan.

6. CONDUCT OF WORKING GROUP ACTIVITIES

The working communication between the WG members is utmost important. The WG will use electronic communication as much as possible. A dedicated Programme web pages will be set up and managed by the IAEA and used both to present finalized information on the Programme (open access) as well as to facilitate exchange of working information among Programme participants (password protected access).

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- At the end of each task, there will be task report and it is expected that the WG members provide input to the Chairman and Secretary in a timely manner.
- The working Group members should provide their input to the task report to the Chairman and Secretary at least one month prior to the milestone schedule indicated in the overall WG schedule.

7. WORKING GROUP MEMBERS

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WORKING GROUP 3
on
ELECTRICAL COMPONENTS AND I&C

DRAFT WORKPLAN

1. BACKGROUND

Many of the operating nuclear power plants are approaching their design life. The operators are facing the choices of either decommissioning the plants or upgrading the plants for a longer operating life, providing that required safety can be maintained. Some Member States (MS) have already developed regulations and regulatory infrastructures for operations beyond the originally designed life, but many others have just started the development and/or planning. Currently, there is no international consensus on requirements for long term operation of nuclear power plants.

An internationally agreed common approach, including regulatory approaches, processes and practices, to support safe long term operation (LTO), which is not available today, needs to be developed. The IAEA has initiated this Extrabudgetary Programme (Programme) to reconcile the regulatory and operational aspects of pressurized water reactors, such as WWERs and PWRs, with regard to LTO. The intent of this Programme is to assist MS considering LTO of PWRs in establishing licensing frameworks, processes, and practices, and to promote exchange of information in these areas. The Programme will integrate existing best national practices that identify the necessary safety criteria, considering practical applications in the MS concerned. The combined experience of all MS participating in this Programme will be used as an input to developing a common approach to safe LTO.

While an international overall guidance on long term operation is not available today, a large body of documents on issues relevant to long term operation is readily available (IAEA, EC, NEA, and others). For example, the IAEA has prepared a draft Safety Guide DS 307, entitled "Periodic Safety Review of Nuclear Power Plants." This Safety Guide provides guidance on safety factors that have to be assessed periodically to ensure safe operation throughout the plant life, but it does not contain any explicit guidance for long term operation. These documents need to be systematically reviewed, compiled and consolidated into a user-friendly document that would provide MS with specific guidance for long term operation. The guidance document should ensure that major safety issues are addressed and lessons learned from MS are incorporated. The guidance document has to be a living document, which would be regularly updated with new lessons learned from all MS. Due to very different nature of laws and regulations in the MS, such guidance document may be supplemented by a country's own document that addresses the country's specific regulatory environment.

Decisions on LTO deal with a number of aspects for maintaining plant safety, in particular those related to managing the safety aspects of ageing of items important to safety. The IAEA has recognized the importance of safety aspects of nuclear power plant ageing in the eighties and initiated activities to increase the awareness of the emerging safety concern related to physical ageing of plant systems, structures and components (SSCs).

The work of this Programme is divided into four Working Groups (WG). Working Group 1 deals with the general aspects of long term operation. It identifies necessary pre-conditions and scoping criteria for Working Groups 2, 3, and 4. The Working Groups 2, 3, and 4

evaluate information for those structures, systems and components that are within the scope of long term operation.

2. OBJECTIVE

The objective of Working Group 3 on electrical components and I&C (E/I&C) is to develop tools to support the identification of safety criteria and practices for E/I&C associated with the LTO of pressurized water reactors. Providing such tools will assist regulators and operators of NPPs in ensuring that the required safety level of their plants is maintained during LTO.

3. SCOPE

Scope of activities for LTO should include the SSC that fall in the following 3 categories:

1. All safety related SSC that are important to the following functions:
- the integrity of the reactor coolant pressure boundary;
- the capability to shut down the reactor and maintain it in a safe shut down condition;
- the capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposure.

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

3. There may also be certain other areas dedicated to a specific functional purpose that may be essential to safe operation of the plant, such as:
- fire protection,
- environmental qualification,
- pressurized thermal shock,
- anticipated transients without scram,
- severe accident management and
- station blackout.

Specifically, for Working Group 3 the scope of this activity is to collect, review and compare, and provide recommendations with respect to ageing management programs and practices for E/I&C systems and components. This would include the following types of equipment:
- Electrical power supply supporting the systems and components that perform the functions described above including e.g. circuit breakers, motor control centres, motors, cables, generators (but not the diesel engine), batteries, invertors, etc.
- I&C systems and components that support the systems that perform the functions described above including e.g. sensors, transducers, cables, electronic modules, relays, operator information devices (alarms, indicators, etc.), controllers, etc.
- Examples of components or devices that interface between the E/I&C and the mechanical components and materials areas are:
  - Sensors penetrating the pressure boundary – the part of the device that maintains the pressure boundary would be covered by Working Group 2, while the part of the device that provides the signal (pressure, temperature, flow, etc.) would be covered under Working Group 3.
  - Valve operators – the signal to the “valve” to open or close, including the electric motor for motor operated valves would be part of Working Group 3, the actuation mechanism that moves the valve internals would be covered by Working Group 2.

Additionally within the scope of Working Group 3, the life-cycle considerations of equipment and components affecting safety functions (repair, replacement, upgrading, etc.) should be reviewed. This is particularly relevant with I&C systems due to improvements in technology.

4. TASKS

Task 1
Collect information on existing research, and regulatory and operational approaches, programs, and practices related to E/I&C essential to safe LTO of PWRs.

Each WG member will provide available information related to ageing and ageing management of E/I&C essential to safe LTO of PWRs in their respective countries, including the applicable laws and regulatory requirements; processes and practices; operational experience; and research (readily available). This will include the identification of information sources. As part of this task, meetings may be held to reach agreement on the format and content of the final documentation. Collecting the necessary information from MS will require that several information collection meetings be held. After agreement on the format and content of the documentation, the information will be distributed to all the WG members in preparation for Task 2.

The WG will develop a standard review process that facilitates a consistent and technically defensible review of MS requirements, approaches, processes, and practices. All of the members of the working group will contribute to the development of this review process. In general the review process will consist of:

- Sorting the information into similar types or classes of equipment and the methodologies, programs etc. for that equipment. One approach is to sort the information based on whether or not the equipment is routinely replaced or seldom or never replaced.
- Review and compare the process and practices (methodologies) in place or planned for the different classes of equipment to identify similarities and to identify differences and investigate the reasons for those differences.

Collection of information for MS that are not represented on the WG will be coordinated through the Programme Steering Committee (SC).

Task 2
Review and compare existing regulatory and operational approaches and practices to identify common elements.

Upon receipt of the information as provided in Task 1, each WG member will review and compare the information from the MS, as assigned by the group leader, to determine common aspects, as well as differences between applicable laws and regulatory requirements; approaches, processes and practices; operational experience; and research associated with the ageing and ageing management of E/I&C essential to safe LTO of PWRs. This review will be conducted in accordance with the detailed review process which will be developed in more detail as part of Task 1.

As part of this task, meetings may be held to reach agreement on the format and content of the final documentation of the results of the individual reviews, as well as integrated review results. After agreement on the format and content of the documentation, each WG member will prepare their findings and forward to the WG Chairman and Secretary, who will review

and then distribute the findings to the other WG members. The compilation of all the individual review results will be reported to the Steering Committee and distributed to the WG members in preparation for Task 3 (via the Programme web site).

Task 3
Develop recommendations and guidelines for inclusion in the draft report to the SC.

The objective of Task 3 is to complete a final report and submit the report to the SC for review and approval. The final report will address the following topics.

1. One section of the report will summarize the regulatory requirements, approaches and laws (if applicable) associated with ageing and ageing management of E/I&C essential to safe LTO of PWRs in the MS, including suggested areas for further development

2. One section of the report will summarize the MS approaches, processes, practices, and operational experience, associated with the ageing and ageing management of E/I&C essential to safe LTO of PWRs, including an assessment of strengths and weaknesses and suggested areas for further development

3. One section of the report will summarize research activities associated with ageing and ageing management of E/I&C essential to safe LTO of PWRs, including suggested areas for further development

4. One section of the report will (1) provide recommendations (guidance) on how to set up an effective program to manage aging in E/I&C to support safe LTO, (2) explain how various approaches, programs, and practices used by MS related to ageing and ageing management of E/I&C need to be coordinated with regulatory approaches, and (3) describe how these activities can be done jointly between regulators and operators.

5. MILESTONES AND DELIVERABLES

Task 1. Collect Information on Mechanical Component and Material Issues
Milestones
1. Complete draft of Standard Review Process
2. Finalize and submit to Steering Committee Standard Review Process for WG 3
3. Complete information collection process

Deliverables
1. Report outlining the Standard Review Process Developed for Working Group 3
2. Report to the SC on the collection of information

Task 2. Assess and Analyze Member State Information
Milestones
1. Complete initial analysis of information collected from Task 1 and identify needed additional information
2. Complete individual WG member reviews of the MS requirements, processes and practices relating to long term operation

Deliverables
1. Individual reviews completed and entered on web-site
2. The compilation of all the individual review results will be reported to the Steering Committee

Task 3. Complete Final Working Group Report to Steering Committee

Milestones

1. Complete draft report for Working Group 3
2. Finalize Report sections addressing the ageing management of E/I&C among Member States

Deliverables

1. Report that addresses the following issues
   - One section of the report will summarize the regulatory requirements, approches and laws for managing the long term operation of the member states' pressurized water reactors.
   - One section of the report will summarize the MS approaches, processes, practices, and operational experience, associated with the ageing and ageing management of E/I&C essential to safe LTO of PWRs, including an assessment of strengths and weaknesses and suggested areas for further development
   - One section of the report will summarize research activities associated with ageing and ageing management of E/I&C essential to safe LTO of PWRs, including suggested areas for further development.
   - One section of the report will (1) provide recommendations (guidance) on how to set up an effective program to manage aging in E/I&C to support safe LTO, (2) explain how various approaches, programs, and practices used by MS related to ageing and ageing management of E/I&C need to be coordinated with regulatory approaches, and (3) describe how these activities can be done jointly between regulators and operators.

6. CONDUCT OF WORKING GROUP ACTIVITIES

The working communication between the WG members is utmost important. The WG will use electronic communication as much as possible. A dedicated Programme web pages will be set up and managed by the IAEA and used both to present finalized information on the Programme (open access) as well as to facilitate exchange of working information among Programme participants (password protected access).

In order to accomplish the activities described in this Workplan the following expectations for members of Working Group are required:

- The number of WG meetings will be limited. Therefore much of the information and WG business will be conducted through email and it is expected that members will respond to email requests for input by the stated deadline.
- Each WG member will come to meetings fully prepared to conduct business and contribute to achieving the meeting objectives.
- Translation of large amount of documents is impractical. It is not expected that each WG member will review all the information. Therefore it is essential to follow the Standard Review Process to ensure the consistency between the reviewers.
- Technical disagreements are to be expected when conducting activities associated with this Workplan. When members disagree with any ideas or concepts it is required that the member offer a solution to resolve the issue.
- Members are expected to involve additional technical experts as necessary to complete WG business.
- At the end of each task, there will be task report and it is expected that the WG members provide input to the Chairman and Secretary in a timely manner.

– The working Group members should provide their input to the task report to the Chairman and Secretary at least one month prior to the milestone schedule indicated in the overall WG schedule.

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WORKING GROUP 4
on
STRUCTURES AND STRUCTURAL COMPONENTS

DRAFT WORKPLAN

1. BACKGROUND

Many of the operating nuclear power plants are approaching their design life. The operators are facing the choices of either decommissioning the plants or upgrading the plants for a longer operating life, providing that required safety can be maintained. Some Member States (MS) have already developed regulations and regulatory infrastructures for operations beyond the originally designed life, but many others have just started the development and/or planning. Currently, there is no international consensus on requirements for long term operation of nuclear power plants.

An internationally agreed common approach, including regulatory approaches, processes and practices, to support safe long term operation (LTO), which is not available today, needs to be developed. The IAEA has initiated this Extrabudgetary Programme (Programme) to reconcile the regulatory and operational aspects of pressurized water reactors, such as WWERs and PWRs, with regard to LTO. The intent of this Programme is to assist MS considering LTO of PWRs in establishing licensing frameworks, processes, and practices, and to promote exchange of information in these areas. The Programme will integrate existing best national practices that identify the necessary safety criteria, considering practical applications in the MS concerned. The combined experience of all MS participating in this Programme will be used as an input to developing a common approach to safe LTO.

While an international overall guidance on long term operation is not available today, a large body of documents on issues relevant to long term operation is readily available (IAEA, EC, NEA, and others). For example, the IAEA has prepared a draft Safety Guide DS 307, entitled "Periodic Safety Review of Nuclear Power Plants." This Safety Guide provides guidance on safety factors that have to be assessed periodically to ensure safe operation throughout the plant life, but it does not contain any explicit guidance for long term operation. These documents need to be systematically reviewed, compiled and consolidated into a user-friendly document that would provide MS with specific guidance for long term operation. The guidance document should ensure that major safety issues are addressed and lessons learned from MS are incorporated. The guidance document has to be a living document, which would be regularly updated with new lessons learned from all MS. Due to very different nature of laws and regulations in the MS, such guidance document may be supplemented by a country's own document that addresses the country's specific regulatory environment.

Decisions on LTO deal with a number of aspects for maintaining plant safety, in particular those related to managing the safety aspects of ageing of items important to safety. The IAEA has recognized the importance of safety aspects of nuclear power plant ageing in the eighties and initiated activities to increase the awareness of the emerging safety concern related to physical ageing of plant systems, structures and components (SSCs).

The work of this Programme is divided into four Working Groups (WG). Working Group 1 deals with the general aspects of long term operation. It identifies necessary pre-conditions and scoping criteria for Working Groups 2, 3, and 4. The Working Groups 2, 3, and 4

evaluate information for those structures, systems and components that are within the scope of long term operation.

2. OBJECTIVE

The objective of Working Group 4 is to develop tools to support the identification of safety criteria and practices for structures and structural components associated with the LTO of pressurized water reactors (PWRs). Providing such tools will assist regulators and operators of NPPs in ensuring that the required safety level of their plants is maintained during LTO.

3. SCOPE

Scope of activities for LTO should include the SSC that fall in the following 3 categories:

1. All safety-related SSC that are important to the following functions:
- the integrity of the reactor coolant pressure boundary;
- the capability to shut down the reactor and maintain it in a safe shut down condition;
- the capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposure.

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

3. There may also be certain other areas dedicated to a specific functional purpose that may be essential to safe operation of the plant, such as:
- fire protection,
- environmental qualification,
- pressurized thermal shock,
- anticipated transients without scram,
- severe accident management and
- station blackout.

The activities of Working Group 4 will be primarily focused on PWR structures and structural components that:
- are needed through LTO
- that are difficult or impossible to replace
- whose integrity is essential to ensure safe LTO.

These structures and structural components may include, but are not limited to:
- Containment (both concrete and steel)
- Other structures (auxiliary building, intake structure, spent fuel pool, etc) and underground piping (not ASME piping) important to safety
- Component supports.

The Working Group 4 will co-ordinate its activity with Working Group 2 in relation to
- material aspects of ageing of steel containments, and structural steel;
- support structures of mechanical components.

The Working Group 4 defines the component supports based on their function to support and anchor the component to the structural load bearing elements.

4. TASKS

Task 1
Collect information on existing research, and regulatory and operational approaches, programs, and practices related to structures and structural components essential to safe LTO of PWRs.

Each Working Group member will collect information related to the applicable laws and regulatory requirements; approaches, processes and practices; research; outstanding technical and programmatic issues; and operational experience, related to ageing and ageing management of structures and structural components essential to safe LTO of PWRs in their respective countries. This will include the identification of information sources. The WG will develop a standard review process that facilitates a consistent and technically defensible review of MS requirements, approaches, processes, and practices. As part of this task, meetings may be held to reach agreement on the format and content of the final documentation. Collecting the necessary information from MS will require that several information collection meetings be held. After agreement on the format and content of the documentation, the information will be distributed to all the WG members in preparation for Task 2.

Collection of information for MS that are not represented on the WG will be coordinated through the Programme Steering Committee (SC).

Task 2
Review and compare existing regulatory and operational approaches and practices to identify common elements

Upon receipt of the information as provided in Task 1, each WG member will review and compare the information from the MS 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, associated with the ageing and ageing management of structures and structural components essential to safe LTO of PWRs. As part of this task, meetings may be held to reach agreement on the format and content of the final documentation of the results of the individual reviews, as well as integrated review results. After agreement on the format and content of the documentation, each WG member will prepare and distribute its findings to the other WG members, and the integrated review results will also be distributed to the WG members in preparation for Task 3.

Task 3
Develop recommendations and guidelines for inclusion in the draft report to the SC.

The objective of Task 3 is to complete a final report and submit the report to the SC for review and approval. The final report will address the following topics.

1. One section of the report will summarize the laws and regulatory requirements associated with ageing and ageing management of structures and structural components essential to safe LTO of PWRs in the MS, including suggested areas for further development.

2. One section of the report will discuss MS approaches, processes, practices, and operational experience, associated with the ageing and ageing management of structures

and structural components essential to safe LTO of PWRs, including an assessment of strengths and weaknesses and suggested areas for further development.

3. One section of the report will discuss research activities and technical and programmatic issues associated with ageing and ageing management of structures and structural components essential to safe LTO of PWRs, including suggested areas for further development.

4. One section of the report will (1) provide guidance on how to set up an effective program to manage aging in structures and structural components to support safe LTO, (2) explain how various approaches, programs, and practices used by MS related to ageing and ageing management of structures and structural components need to fit with regulatory criteria and approaches, and (3) describe how these activities can be done jointly between regulators and operators.

5. MILESTONES AND DELIVERABLES

Task 1. Collect Information on Structural Components and Structures

Milestones

1. Complete draft of Standard Review Process (incl. format of presentation of information)
2. Finalize and submit to SC the Standard Review Process for WG 4
3. Complete information collection

Deliverables

1. Report outlining the Standard Review Process developed for Working Group 4
2. Report to the SC on the collection of information

Task 2. Assess and Analyze Member State Information

Milestones

1. Complete initial analysis of information collected from Task 1 and identify needed additional information
2. Complete draft report that outlines MS requirements, processes and practices relating to long term operation
3. Finalize report on MS requirements, processes and practices relating to long term operation

Deliverables

1. Report that describes for member states requirements, processes and practices relating to long term operation

Task 3. Complete Final Working Group Report to Steering Committee

Milestones

1. Complete draft report for Working Group 4
2. Finalize report on MS requirements, processes and practices relating to long term operation of structures and structural elements

Deliverables

Report that addresses the following issues:

1. One section of the report will summarize the applicable laws, regulatory requirements and operational approaches to regulating and managing the long term operation of the MS pressurized water reactors.
2. One section of the report will discuss MS approaches, processes, practices, and operational experience, associated with the ageing and ageing management of structures and structural components essential to safe LTO of PWRs, including an assessment of strengths and weaknesses

3. One section of the report will identify potential safety issues where additional regulatory and/or operational development may be needed. This section of the report will also identify any critical safety issues that need to be resolved.
4. One section of the report will contain recommendations from the WG for resolving the most critical safety issues.

6. CONDUCT OF WORKING GROUP ACTIVITIES

The working communication between the WG members is utmost important. The WG will use electronic communication as much as possible. A dedicated Programme web pages will be set up and managed by the IAEA and used both to present finalized information on the Programme (open access) as well as to facilitate exchange of working information among Programme participants (password protected access).

In order to accomplish the activities described in this Workplan the following expectations for members of Working Group are required:

- The number of WG meetings will be limited. Therefore much of the information and WG business will be conducted through email and it is expected that members will respond to email requests for input by the stated deadline.
- Each WG member will come to meetings fully prepared to conduct business and contribute to achieving the meeting objectives.
- Translation of large amount of documents is impractical. It is not expected that each WG member will review all the information. Therefore it is essential to follow the Standard Review Process to ensure the consistency between the reviewers.
- Technical disagreements are to be expected when conducting activities associated with this Workplan. When members disagree with any ideas or concepts it is required that the member offer a solution to resolve the issue.
- Members are expected to involve additional technical experts as necessary to complete WG business.
- At the end of each task, there will be task report and it is expected that the WG members provide input to the Chairman and Secretary in a timely manner.
- The working Group members should provide their input to the task report to the Chairman and Secretary at least one month prior to the milestone schedule indicated in the overall WG schedule.

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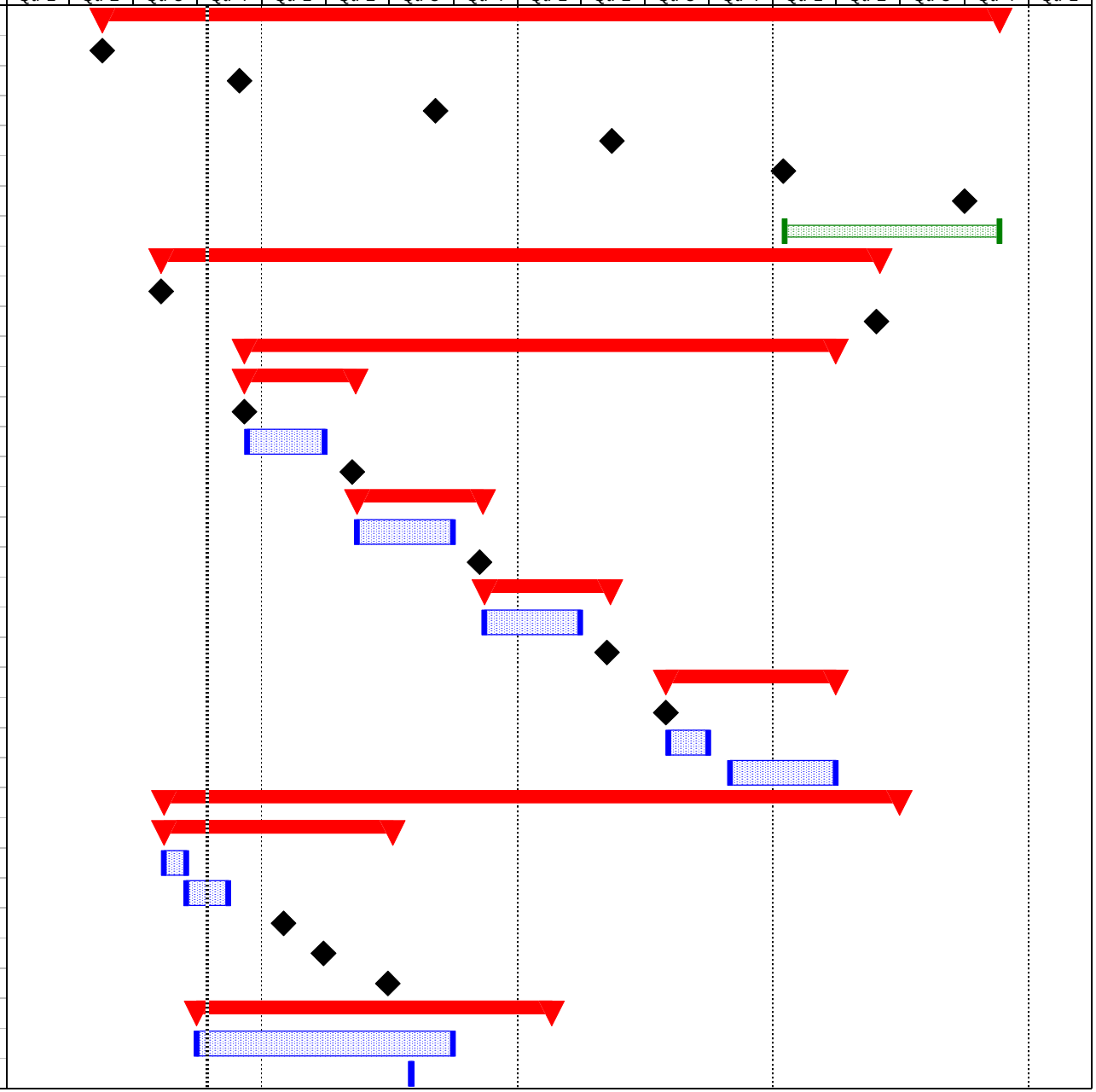
APPENDIX II.
PROGRAMME SCHEDULE

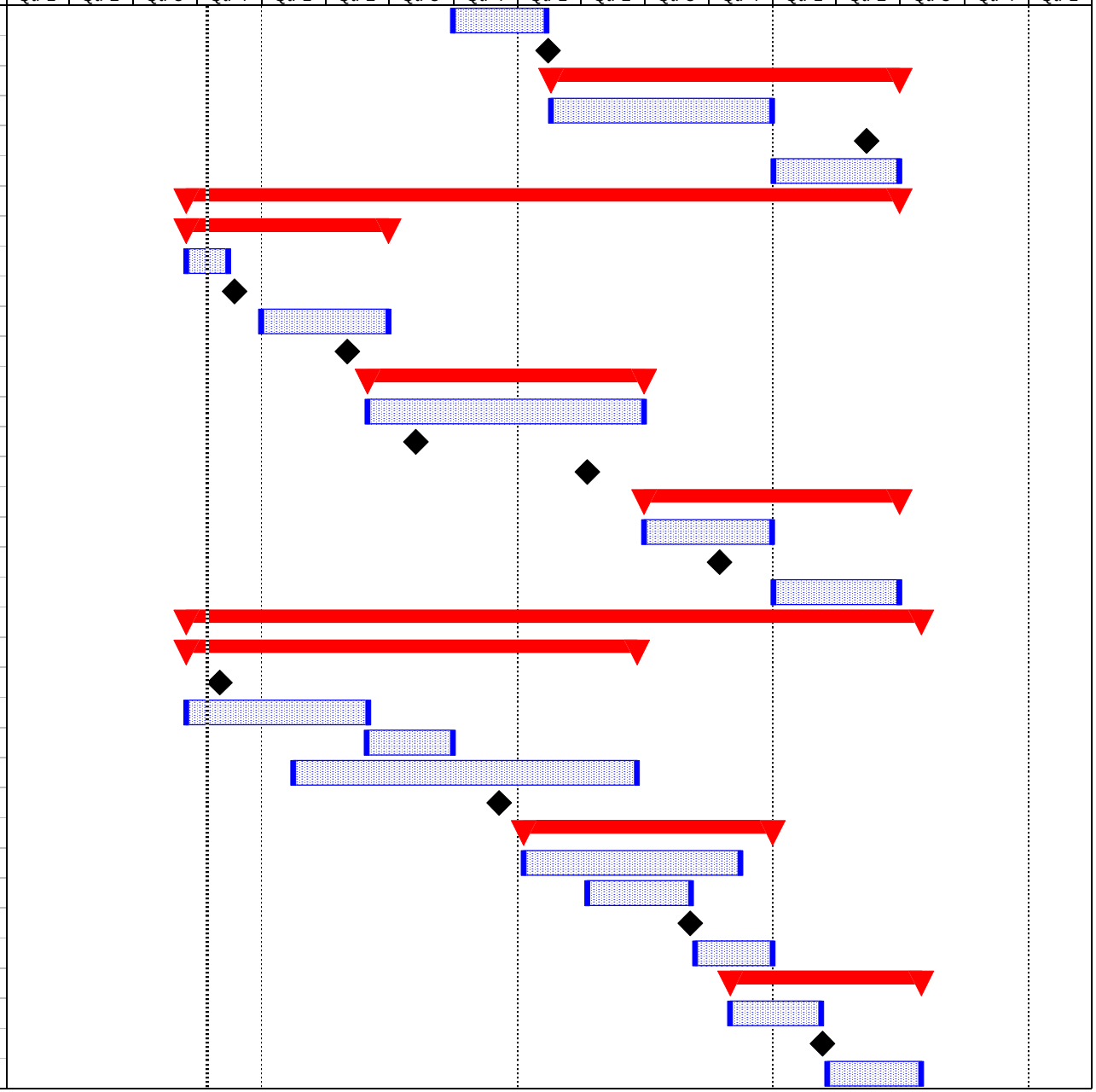
IAEA EBP ON SAFETY ASPECTS OF LONG TERM OPERATION OF PRESSURIZED WATER REACTORS

ID	Task Name	Duration	Start	Finish
1	**Steering Committee**	**916 d**	**03-05-19**	**06-11-20**
2	1SCMtg	3 d	03-05-19	03-05-21
3	2SCMtg	3 d	03-12-01	03-12-03
4	3SCMtg	3 d	04-09-06	04-09-08
5	4SCMtg	3 d	05-05-16	05-05-18
6	5SCMtg	3 d	06-01-16	06-01-18
7	6SCMtg	3 d	06-10-02	06-10-04
8	SC Final Report	219 d	06-01-18	06-11-20
9	**WG Leaders co-ordination**	**735 d**	**03-08-11**	**06-06-02**
10	Planning Mtg	4 d	03-08-11	03-08-14
11	Wrap-up Mtg	5 d	06-05-29	06-06-02
12	**WG 1 Gen LTO Framework**	**605 d**	**03-12-08**	**06-03-31**
13	**Task 1**	**115 d**	**03-12-08**	**04-05-14**
14	Kick-off Mtg	5 d	03-12-08	03-12-12
15	Draft Rpt	79 d	03-12-12	04-03-31
16	Final Rpt	5 d	04-05-10	04-05-14
17	**Task 2**	**130 d**	**04-05-17**	**04-11-12**
18	Draft Rpt	99 d	04-05-17	04-09-30
19	Final Rpt	5 d	04-11-08	04-11-12
20	**Task 3**	**130 d**	**04-11-15**	**05-05-13**
21	Draft Rpt	99 d	04-11-15	05-03-31
22	Final Rpt	5 d	05-05-09	05-05-13
23	**Task 5**	**175 d**	**05-08-01**	**06-03-31**
24	Agree WG final Rpt	5 d	05-08-01	05-08-05
25	WG draft Rpt	41 d	05-08-05	05-09-30
26	WG final Rpt	109 d	05-11-01	06-03-31
27	**WG 2 Mechanical/Materials**	**751 d**	**03-08-15**	**06-06-30**
28	**Task 1**	**233 d**	**03-08-15**	**04-07-06**
29	Draft St.Rev.Proc.	22 d	03-08-15	03-09-15
30	Final St.Rev.Proc.	44 d	03-09-16	03-11-14
31	Kick-off&D.coll.Mtg.-US	5 d	04-02-02	04-02-06
32	Data coll. Mtg. EUR	5 d	04-03-30	04-04-05
33	Data coll. Mtg. Rus	5 d	04-06-30	04-07-06
34	**Task 2**	**363 d**	**03-10-01**	**05-02-18**
35	Init.anal.of info	262 d	03-10-01	04-09-30
36	Final req.for info.	1 d	04-08-02	04-08-02



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

ID	Task Name	Duration	Start	Finish
37	Draft Rpt.-Req.	96 d	04-10-01	05-02-11
38	Final Rpt.-Req.	5 d	05-02-14	05-02-18
39	**Task 3**	**356 d**	**05-02-18**	**06-06-30**
40	WG draft Rpt	226 d	05-02-18	05-12-30
41	Resolve SC comments Mtg	5 d	06-05-15	06-05-19
42	WG final Rpt	130 d	06-01-02	06-06-30
43	**WG 3 Electrical/I&C**	**729 d**	**03-09-16**	**06-06-30**
44	**Task 1**	**207 d**	**03-09-16**	**04-06-30**
45	Final St.Rev.Proc.	44 d	03-09-16	03-11-14
46	Kick-off Mtg Vie	5 d	03-11-24	03-11-28
47	Collect info	130 d	04-01-01	04-06-30
48	Data coll. Mtg.	5 d	04-05-03	04-05-07
49	**Task 2**	**283 d**	**04-06-01**	**05-06-30**
50	Init.anal.of info	283 d	04-06-01	05-06-30
51	Anal.info Mtg.	5 d	04-08-09	04-08-13
52	Anal.info.Mtg.	5 d	05-04-11	05-04-15
53	**Task 3**	**261 d**	**05-07-01**	**06-06-30**
54	WG draft Rpt	131 d	05-07-01	05-12-30
55	Resolve SC commentsMtg.	5 d	05-10-17	05-10-21
56	WG final Rpt	130 d	06-01-02	06-06-30
57	**WG 4 Structures**	**750 d**	**03-09-16**	**06-07-31**
58	**Task 1**	**460 d**	**03-09-16**	**05-06-20**
59	Kick-off&D.coll.Mtg.	5 d	03-11-03	03-11-07
60	Draft St.Rev.Proc.	186 d	03-09-16	04-06-01
61	Final St.Rev.Proc.	89 d	04-05-31	04-09-30
62	Collect info	351 d	04-02-16	05-06-20
63	Info collection Mtg	5 d	04-12-06	04-12-10
64	**Task 2**	**255 d**	**05-01-10**	**05-12-31**
65	Init.anal.of info/missing info	222 d	05-01-10	05-11-15
66	Draft Rpt.-Req.	106 d	05-04-11	05-09-05
67	Rpt findings Mtg.	5 d	05-09-05	05-09-09
68	Final Rpt.-Req.	80 d	05-09-12	05-12-31
69	**Task 3**	**195 d**	**05-11-01**	**06-07-31**
70	WG draft Rpt	94 d	05-11-01	06-03-10
71	Resolve SC comments Mtg.	5 d	06-03-13	06-03-17
72	WG final Rpt	96 d	06-03-20	06-07-31



APPENDIX III.
PROVISIONAL AGENDA

Monday, 11 August 2003		
09:30	Opening, Meeting objective	R. Havel
09:40	SC Chairman address	F. Gillespie
10:00	WG 1 Workplan presentation	P-T. Kuo
10:20	WG 1 Workplan discussion	
11:00	*Coffee break*	
11:30	WG 2 Workplan presentation	V. Piminov/T.Taylor
11:50	WG 2 Workplan discussion	
12:30	*Lunch break*	
14:00	WG 3 Workplan presentation	V. Bezsaly/B.Moffitt
14:20	WG 3 Workplan discussion	
15:00	*Coffee break*	
15:30	WG 4 Workplan presentation	T. Katona/W.Burton
15:50	WG 4 Workplan discussion	
16:30	Discussion on common elements	F. Gillespie
17:30	Adjourn	
19:00	*'Heurigen'*	
Tuesday, 12 August 2003		
09:30	Discussion on common elements cont'd	F. Gillespie
11:00	*Coffee break*	
11:30	Discussion on common elements cont'd	F. Gillespie
12:30	*Lunch break*	
14:00	Revision of individual Workplans	WG leaders/secretaries
17:30	Adjourn	
Wednesday, 13 August 2003		
09:30	Presentation of revised WG 1 Workplan	P-T. Kuo
09:45	Presentation of revised WG 2 Workplan	V. Piminov
10:00	Presentation of revised WG 3 Workplan	V. Bezsaly
10:15	Presentation of revised WG 4 Workplan	T. Katona
10:30	*Coffee break*	
11:00	Development of detailed schedule for each WG	WG leaders/secretaries
12:30	*Lunch break*	
14:00	Development of detailed schedule for each WG cont'd	WG leaders/secretaries
17:30	Adjourn	
Thursday, 14 August 2003		
09:30	Presentation and discussion of WG schedules	WG leaders/secretaries
11:00	*Coffee break*	
11:30	Format and contents of WG deliverables	WG leaders/secretaries
12:30	*Lunch break*	
14:00	Finalization of Workplans	WG leaders/secretaries
17:30	Adjourn	
Friday, 15 August 2003		
09:30	Final discussions	
12:30	Concluding remarks	

APPENDIX IV.
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