IAEA
International Atomic Energy Agency

OSART Guidelines

2015 Edition

Reference Report for
IAEA Operational Safety Review Teams
(OSARTs)

Vienna, February 2016

IAEA Services Series 12 (Rev. 1)

IAEA SAFETY STANDARDS AND RELATED PUBLICATIONS

IAEA SAFETY STANDARDS

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OSART GUIDELINES

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OSART GUIDELINES

2015 EDITION

REFERENCE REPORT FOR IAEA OPERATIONAL
SAFETY REVIEW TEAMS (OSARTs)

INTERNATIONAL ATOMIC ENERGY AGENCY
VIENNA, 2016

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FOREWORD

The IAEA works to provide a global nuclear safety and security framework for the protection of people and the environment from the effects of ionizing radiation, the minimization of the likelihood of accidents that could endanger life and property, and effective mitigation of the effects of any such events, should they occur.

The strategic approach to achieving such a framework involves continual improvement in four areas: national and international safety infrastructures; the establishment and global acceptance of IAEA safety standards; an integrated approach to the provision for the application of the safety standards; and a global network of knowledge and experience.

The IAEA Operational Safety Review Team (OSART) programme provides advice and assistance to Member States to enhance the safety of nuclear power plants during commissioning and operation. The OSART programme, initiated in 1982, is available to all Member States with nuclear power plants under commissioning or in operation.

Conservative design, careful manufacture and sound construction are all prerequisites for the safe operation of nuclear power plants. However, the safety of the plant also depends ultimately on: sound management, policies, procedures, processes and practices; the capability and reliability of commissioning and operating personnel; comprehensive instructions; sound accident management and emergency preparedness; and adequate resources. Finally, a positive attitude and conscientiousness on the part of all staff in discharging their responsibilities is important to safety.

The OSART programme is based on the safety standards applicable to nuclear power plants. IAEA safety standards reflect the consensus of Member States on nuclear safety matters. The reports of the International Nuclear Safety Group identify important current nuclear safety issues and also serve as references during an OSART review. The publication OSART Guidelines provides overall guidance on the conduct of OSART missions for both the review experts and their plant counterparts to ensure the consistency and comprehensiveness of the operational safety review.

OSART reviews are performance oriented in that they accept different approaches to commissioning and operational safety that represent good practices and may contribute to ensuring a good safety performance for the operating organization. Recommendations are made on items which are so far not covered by the safety standards, and proposed suggestions might help to find more effective ways to ensure, and further enhance, plant safety. Recognition is also given to the efforts made by the plant to develop and implement an action plan for specific safety improvements identified prior to the IAEA mission. Commendable good practices identified at plants are registered in an IAEA database, to which access is provided to other plants to put in place operational safety improvements worldwide.

This publication updates OSART Guidelines (2005 Edition). The IAEA officer responsible for this publication was V. Ranguelova of the Division of Nuclear Installation Safety.

EDITORIAL NOTE

CONTENTS

1. INTRODUCTION

One of the IAEA's safety review services is the Operational Safety Review Team (OSART) programme. Established in 1982, the OSART programme has provided advice and assistance to Member States for more than 30 years, in order to enhance the safety of nuclear power plants during construction, commissioning and operation. It has also been greatly valued for providing an opportunity for nuclear power plant operators in all countries to assist other operators through the dissemination of information on best practices and lessons learned. OSART reviews have taken place in all countries operating NPP. Each OSART mission is conducted by a team of experts drawn from all regions of the world. Each of these experts has extensive experience in nuclear power plant operation, and the cumulative nuclear experience in a team often exceeds 300 years.

The OSART programme is the main approach to providing for better and wider application of the IAEA safety standards, related to nuclear power plant operation, since the guidelines used to review plant performance and programmes are based on these standards.

1.1. USE OF OSART GUIDELINES

These guidelines have been prepared to provide a basic structure and common terms of reference, both across the various areas covered by an OSART mission and across all the missions in the programme. As such, they are addressed - and should give guidance on how to prepare for and conduct an OSART mission – to:

— The team members of the OSART mission;
— The host nuclear power plant receiving the OSART mission;
— The host country that has invited the OSART mission.

In particular, the reference documentation, given at the end of the document, will also prove valuable reading for staff at the host nuclear power plant.

The OSART review is based on the documents that describe the plant and its structures, systems and components; the organization, training and qualification of plant personnel; written procedures applicable to the operation of the plant; interviews and discussions with plant personnel; observations of plant material conditions, operating practices and work in the field; and the records and reports of its operating history. The review focuses on performance in various areas important to safety, managerial aspects of policy implementation, control of activities, verification and correction, as well as document control. An OSART review may also take place within a nuclear power project, at the critical commissioning phase when many decisions are being taken that will affect operational safety throughout the life of the plant (Pre-operational OSART).

Specific review guidelines are presented in Sections 4.1 to 4.15, covering the following OSART review areas:

(1) Leadership and management for safety (LM)
(2) Training and qualification (TQ)
(3) Operations (OPS)
(4) Maintenance (MA)
(5) Technical support (TS)
(6) Operating experience feedback (OE)

(7) Radiation protection (RP)
(8) Chemistry (CH)
(9) Emergency preparedness and response (EPR)
(10) Accident management (AM)
(11) Human-technology-organization interaction (HTO)
(12) Long term operation (LTO)
(13) Commissioning (COM)
(14) Transitional period from operation to decommissioning (TRAD)
(15) Use of PSA for plant operational safety improvements (PPSA).

Corporate OSARTs are performed on a case-by-case basis, taking into consideration specific corporate organizational structures. The current guidelines may also be used to support implementation of the Corporate OSART missions.

Since an OSART mission may be carried out at any time during the lifetime of a nuclear power plant after the commencement of construction, the areas to be reviewed will depend on the status of the plant project. Normally, areas 1 to 11 (and 12 for plants planning to extend their operating lifetime) will be reviewed at an operational plant. This is the 'core OSART mission' offered by the IAEA. If the review is carried out close to the time of commissioning, the review will also use module 13. For plants with a scheduled final shutdown date, the review will use modules 1 to 11 and module 14. Plants may also ask for a more detailed review of their probabilistic safety analysis applications by adding module 15 to the scope of the OSART.

It is important to note that an OSART review is a flexible service. The review areas can be tailored, at the request of the host plant. The actual scope of the mission is defined and agreed during the preparatory meeting, which is normally conducted about 12-18 months before the mission.

The specific guidelines for each area are intended to help each expert formulate the review in the light of personal experience and in accordance with the IAEA Safety Standards. The guidelines are not all-inclusive and should not limit the expert's investigations, but are better considered as illustrating the comprehensive requirements for review. Therefore it is expected that - based on the advance information, including the results of the plant's self-assessment, where applicable, and the results of the first part of the review - the experts apply judgment to decide which topics need more in-depth evaluation.

1.2. OBJECTIVES AND BENEFITS OF OSART MISSIONS

The OSART mission is a peer review conducted by a team of international experts with direct experience applicable to the technical areas of evaluation. Assessments of performance are made based on the IAEA Safety Standards. The review is therefore neither a regulatory inspection nor an audit against national codes and standards. Instead, it is a technical exchange of experiences and practices at the working level, aimed at finding opportunities for strengthening programmes, procedures and practices at the NPP being reviewed.

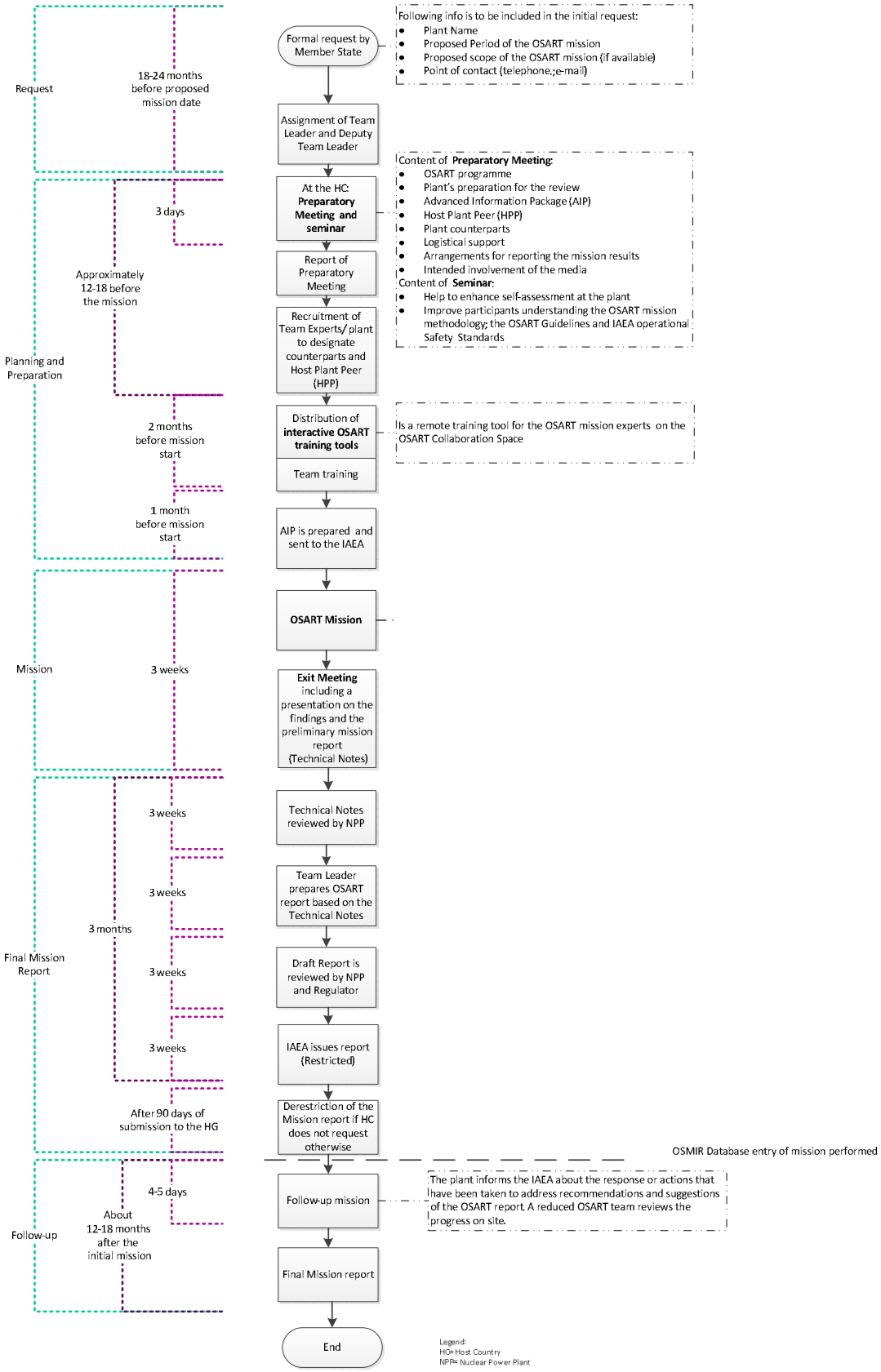
The key objectives of an OSART mission are:

— to provide the host plant with an opportunity to review its conformance with the IAEA Safety Standards and identify possible areas for improvement by conducting a self-assessment in the preparation phase prior to the mission;

- to provide the host country (regulatory authority, plant/utility management and governmental authorities) with an objective and independent assessment of the status of NPP operational safety with respect to the IAEA Safety Standards of operational safety;
- to provide the host plant with written recommendations in those areas needing improvements to meet the IAEA Safety Standards;
- to provide the host plant with written suggestions when a policy or programme could be expanded or improved, with reasonable effort;
- to provide the host plant with recognition for its self-identified issues and for implementation of action plans developed to close the gaps to IAEA Safety Standards identified by the plant during its self-assessment;
- to identify good practices, which are worthy of bringing to the attention of the international nuclear industry, thus facilitating their application in other nuclear power plants;
- to provide key staff at the host plant with informal assistance or advice on ways in which improvements might be achieved;
- to provide experts and observers from Member States and IAEA staff with opportunities to broaden their experience and knowledge of their own field; in addition, to learn the review methodology for operational safety, which will enhance their management skills;
- to promote opportunities for IAEA staff to identify areas where IAEA Safety Standards could be further strengthened.

2. METHODOLOGY FOR OSART MISSIONS

A standard OSART process follows the steps and the timeframe identified in the following flowchart.



2.1. INITIATING AN OSART MISSION

2.1.1. Member State request for an OSART mission

Normally, an OSART mission is requested by a nuclear power plant or utility via its national nuclear safety regulatory authority or other relevant governmental body. A request for an OSART mission should be transmitted to the IAEA Deputy Director General, Nuclear Safety and Security Department, 18-24 months before its proposed date.

The following information should be included in the request for an OSART mission:

— The plant name;

— The proposed period of the OSART mission;

— The proposed scope of the OSART mission, if already available;

— A point of contact (name, telephone, e-mail address, etc.).

2.1.2. IAEA initial response

On receipt of a request for an OSART mission, an IAEA team leader will be assigned to establish liaison contacts with the utility and regulatory authority, and arrange a preparatory meeting with the plant management and other organizations involved. The IAEA will coordinate with other international organizations to make sure that there is no conflict of schedule for the OSART mission.

2.2. OSART PREPARATORY MEETING

The purpose of the three-day OSART preparatory meeting is to familiarize plant staff with the OSART methodology and to discuss the necessary arrangements which have to be implemented prior to the mission. The preparatory meeting, usually attended by the team leader (TL) and deputy team leader (DTL), is held at the plant site (approximately 12-18 months prior to the mission) so as to ensure that plant management, counterparts and other organizations involved can all participate. During the first part of the preparatory meeting, the following subjects are covered:

— The main features of the OSART programme;
— The exact scope of the review, reflecting the request of the host plant;
— Plant management preparations for the review;
— Preparation of the Advance Information Package (AIP)/self-assessment;
— Logistical support required;
— Financial arrangements.

The last two days of the preparatory meeting are dedicated to a detailed presentation of the OSART methodology to plant staff. Plant staff familiarize themselves with the OSART Guidelines and the IAEA Safety Standards related to operational safety that form the basis of OSART evaluations. In addition, plant staff are trained to apply OSART ‘field review’ and ‘issue development’ techniques through practical exercises within the plant. The seminar is designed to help the plant conduct its operational safety self-assessment and prepare for the OSART mission. The plant will be offered the opportunity to send (an)

observer(s)/reviewer(s) on (an)other OSART(s) before the plant mission, to gain practical experience on the way OSART missions are conducted.

Following the preparatory meeting, the IAEA will recruit the team members, and plant management should designate one counterpart for each area of review to be the contact person for the corresponding team member during the review.

The plant should designate a Host Plant Peer (HPP) with the following characteristics, roles and responsibilities:

— The HPP is a plant staff member with good overall knowledge of the plant, its programmes and staff, and with good English language skills;
— The HPP main role is to act as liaison officer between the plant and the IAEA team. However, the HPP is not a part of the IAEA review team;
— During the three weeks of the mission, the HPP does not have any plant responsibilities;
— The HPP participates in the OSART team meetings, and advises the OSART team members when information may not be complete or correct;
— In case of misunderstandings or issues needing further clarification, the HPP points the OSART team towards the responsible or knowledgeable plant persons in specific areas who could provide clarification and clear any misunderstandings.

Upon the return from the mission, the Team Leader prepares a report of the preparatory meeting, copies of which will be sent for review and comment to plant/utility/regulatory management that participated in the preparatory meeting. The final report will be circulated to the same recipients.

2.3. PLANT PREPARATIONS FOR AN OSART MISSION

The plant needs to prepare an Advance Information Package (AIP) and send it to the IAEA for distribution to the OSART team members at least one month prior to the mission. The package should contain adequate information and data to ensure a good understanding of the overall organizational structures and current operating practices. It should also include the plant staff approach to operational safety, the key operational features and safety performance indicators, as well as the organizational setup.

An important aspect of plant staff preparations for an OSART mission is the conduct of a thorough self-assessment of the plant operational safety using as a basis the IAEA Safety Standards. The results of the self-assessment should be included in the AIP in sufficient detail for the IAEA team members to understand any challenges which the plant might currently be facing. While the specific methodology used to conduct the self-assessment is left to plant staff, the results of the self-assessment should contain the following key components:

— For each review area, a description of how each individual expectation, as described in Section 4, is met. This information shall typically be presented on 3 to 4 pages.
— Specific gaps where performance or programmes do not fully meet IAEA Safety Standards.
— Where gaps are identified, an explanation of what corrective actions are being taken/planned to close the gap, including budget commitments, staffing, document preparation, increased or modified training, equipment purchases, etc.

While the contents of the AIP should cover essential plant operational safety information, they should also be concise. All descriptions in the package should be in English, as this is the OSART working language. An example of typical AIP content is given in Annex 1.

2.4. PREPARATION OF THE OSART MISSION

The following provides an overview of key preparations expected to be taken by the OSART team and plant staff in the period between the OSART preparatory meeting and the commencement date of the OSART mission:

9 months to 3 months before the OSART mission

The designated IAEA Team Leader assembles the mission team. The team will contain a Deputy Team Leader from the IAEA and professionals from diverse backgrounds, and may include new OSART reviewers, experienced reviewers, operators, and representatives of Technical Support Organizations and Regulatory Authorities.

The IAEA ensures that the HPP identifies and communicates, to the IAEA and the OSART team members, all the information that may be needed for team members to be granted plant access. This information, and relevant forms which need to be completed, should be provided to team members in sufficient time to allow for their completion, prior to arrival on site.

3 months to 2 weeks before the OSART mission

The Team Leader maintains contact with the HPP during this period to confirm that all arrangements are progressing as planned, i.e., the plant has made arrangements for a hotel, with the workspace and PC hardware needed for the OSART team members; the AIP has been sent to the IAEA team members; the plant has received all the information necessary to ensure that the OSART team members will have access to the plant; all logistical support needed for the mission is ensured; and the team is made aware of initial arrangements regarding collection from the airport and any initial (first day) activities.

1 day before the start of the OSART mission

One day prior to the start of the OSART mission, the OSART team will meet at the plant site. During this day:

— training is given to the OSART team members by plant staff to grant them escorted access to the nuclear power plant.
— a whole body count is completed for each member of the OSART team, according to the relevant plant procedures.
— the IAEA TL & DTL check that the Local-Area Network (LAN) to be used by the OSART team is set up and that OSART common folders have been created, where all the information needed to perform the OSART mission is uploaded.
— the TL & DTL conduct the IAEA OSART team training.

2.5. THE OSART MISSION

2.5.1. Team composition and conduct

The OSART team is composed of a Team Leader and a Deputy Team Leader, who are always IAEA staff members, up to sixteen reviewers and up to three observers. The area of Operations is usually reviewed by two reviewers. Normally, the reviewers should have a minimum of ten years of work experience in the nuclear field, and a minimum of five years of experience of working in a supervisory position in the area of review. Potential reviewers with less than this level of experience but who have been identified by their senior managers as highly capable, and whose development will benefit from participation will also be considered at the discretion of the IAEA. The team will not include a member from the host country, or experts who may have conflicts of interest.

The team will carry out the OSART mission following the Code of Conduct described in Annex 2.

2.5.2. Schedule

TABLE 1. A TYPICAL OSART REVIEW SCHEDULE

	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
Week 1	Travel	Travel	Training	Entrance meeting and plant tour	Area review	Area review	Area review
Week 2	Team rest	Team discussion on potential issues	Area review	Area review	Area review	Area review	Area review
Week 3	Drafting issues for Technical Notes	Team rest	Complete drafting of Technical Notes	Whole team reviews draft Technical Notes	Finalise Technical Notes following discussion with counterpart	Exit meeting Travel home	Travel home

On the first day of the mission (usually a Tuesday), an entrance meeting is held in the morning. This meeting is attended by plant management, representatives from the nuclear safety regulatory authority and other concerned authorities, the OSART team members and their counterparts from the plant. In the afternoon, a plant tour is conducted in several groups, with the aim of covering as many areas of the plant as possible.

On the second day of the mission, work starts usually with individual interviews, observations and discussions with plant counterparts in each of the OSART review areas. At 16:00, the OSART members prepare their daily notes and, at the end of the day, the OSART team holds its daily meeting to exchange information on facts/concerns observed or identified during the day. The plant HPP is invited to attend the OSART team daily meetings and, if needed, provide additional clarification on some of the observations. In the course of the review, each review member is expected to transform his/her observations into working notes, which ultimately form the basis of the OSART team Technical Notes.

The last two days of the mission are reserved for completing the mission's Technical Notes, and for the team to reach consensus on all the recommendations, suggestions, self-identified issues and good practices.

The exit meeting, during which each OSART reviewer presents the findings in his/her review area, takes place in the morning of the last day of the mission. This meeting is attended by plant management, the regulatory authority and any other concerned organizations, along with plant staff. The dates of the OSART follow-up mission are also agreed between the OSART TL and plant management. Upon completion of the exit meeting, a press conference may take place, if so requested and organized by the plant.

2.5.3. The review

The OSART team uses the following sources to acquire the information needed to develop its recommendations, suggestions and self-identified issues and to prepare the OSART mission report. These are:

- Reviews of plant documents such as procedures, surveillance tests record, etc, including the AIP;
- Interviews with plant personnel;
- Direct observations of staff performance and equipment conditions, both at site and off-site facilities.

To be able to make informed assessments, reviewers are expected to cover each topic to the extent necessary, based on the questions contained in each of the specific review areas Working Notes Outlines (WNOs) which are available at the IAEA OSART collaboration website. Review findings should be described and supported by accurate facts to the degree required to make the significance of findings understandable. Formulation of recommendations, suggestions and self-identified issues should be based on the identified gaps as compared to IAEA Safety Standards. Similarly, good practices that are identified during the process of the review, and should be documented for the benefit of other Member States, are described in the OSART report in sufficient detail as to be readily understood.

It is expected that plant operational activities during the OSART mission will follow the established work schedule, so that the team will be able to observe typical operational activities.

Security issues are not in the scope of the OSART review, but synergy between safety and security should be reviewed to ensure that security measures do not compromise safety. If security-related issues are identified/observed by the team, they should be brought to the attention of the plant manager.

Plant documents

Documents of general interest to the whole team, including the results of the plant self-assessment, are included in the Advance Information Package. In addition, during the review, each expert may decide to review additional documents, specific to his area and used by the plant.

Interviews

Interviews with plant personnel are used by the IAEA team to:

— Gather additional information not covered by documentation;
— Seek answers to questions, and thus perhaps satisfy possible IAEA concerns arising out of the documentation review;
— Assess plant staff understanding of their duties and responsibilities;
— Assess plant staff competence, professionalism and commitment to nuclear safety;
— Provide the opportunity for all important information to be exchanged between reviewers and counterparts, and therefore should be held at the working level, between peers.

These interviews should be open discussions and not interrogations of the counterparts by the reviewers. Properly conducted, these interviews are an important part of the OSART mission.

Direct observation

Direct observation of operational and work activities underway is one of the most important aspects of the review process. A substantial part of the review period is spent at the plant observing behaviours of staff in the field, including reviewing procedure use and work practices. In addition, plant workers may be interviewed to gain an understanding of their technical knowledge, skills, attitudes and morale. The observation of work should include nuclear and industrial safety practices, use of procedures, drawings and instructions, use of quality control measures, and supervision and management control of work. Section 3 of these guidelines provides practical advice to reviewers on conducting observations.

Based upon the reviews of documentation, interviews and observations, the reviewer can then assess performance. It may take several iterations through document review, interview and observation to gain sufficient facts to complete an assessment.

2.5.4. Evaluation criteria

The focus of an OSART mission is on identifying gaps from IAEA Safety Standards, since they represent the largest opportunities for safety improvement at the plant being reviewed. Other publications such as INSAG reports and IAEA Safety Series Reports also provide additional information relevant to the OSART review.

In the evening of each working day of the review, at the meeting called by the TL each expert summarizes his/her concerns developed during the day, including perceived strengths and weaknesses. This creates an opportunity for other team members to contribute their views, further strengthening the experience base of the evaluation.

The OSART review thus provides an objective comparison of the observed plant safety performance with the IAEA safety standards. This comparison may result in a

recommendation, suggestion, self-identified issue or good practice, in accordance with the following definitions:

Recommendation
A recommendation is advice on what improvements in operational safety should be made in the activity or programme that has been evaluated. It is based on inadequate conformance with the IAEA Safety Requirements and addresses the general concern rather than the symptoms of the identified concern. Recommendations are specific, realistic and designed to result in tangible improvements.

Suggestion
A suggestion is advice on an opportunity for safety improvement not directly related to inadequate conformance with the IAEA Safety Requirements. It is primarily intended to make performance more effective, to indicate useful expansions to existing programmes and to point out possible superior alternatives to ongoing work.

Self-identified issue
A self-identified issue is documented by the OSART team in recognition of plant actions taken to address inadequate conformance with the IAEA Safety Requirements identified in the self-assessment made by the plant prior to the mission and reported to the OSART team. Credit is given for the fact that actions have been taken, including root cause determination, which lead to a high level of confidence that the issue will be resolved within a reasonable timeframe. These actions should include budget commitments, staffing, document preparation, increased or modified training, equipment purchases, etc.

Good practice
A good practice is an outstanding and proven programme, activity or equipment in use that contributes directly or indirectly to operational safety and sustained good performance. A good practice is markedly superior to that observed elsewhere, not just the fulfilment of current requirements or expectations. It should be superior enough and have broad enough application to be brought to the attention of other nuclear power plants and be worthy of their consideration in the general drive for excellence. A good practice is novel; has a proven benefit; is replicable (it can be used at other plants); and does not contradict an issue. Normally, good practices are brought to the attention of the team on the initiative of the plant.

2.5.5. Reporting

Technical notes
During the course of the review, after the evening team meeting, each team member writes notes on his observations and conclusions, including any recommendations, suggestions, self-identified issues or good practices. The Technical Notes are the combined ‘field notes’ of the individual experts and are considered by the IAEA to be “restricted documents”. Each recommendation, suggestion and self-identified issue contained in the Technical Notes is referenced to the relevant requirement of an IAEA Safety Standard. A copy of the Technical Notes is given to the plant manager prior to the exit meeting.

A copy of the Technical Notes should not be provided to the regulatory authority by the utility if the Technical Notes will in turn be made public. The utility, however, is encouraged to let the regulatory authority read the Technical Notes at the plant site.

The OSART Report

On completion of the OSART review, the TL will prepare the OSART Report, based on the above Technical Notes. This is an official IAEA document, which summarizes the team's main observations and conclusions, including all recommendations, suggestions, self-identified issues and good practices. The report may also include encouragements for improvements on concerns that do not fulfil the definitions for recommendations, suggestions or self-identified issues. The report may also include good performances that do not fulfil the definition of a good practice. Before the text is finalized, the utility and regulatory authority concerned are given the opportunity to offer comments. This report is submitted through official channels to the Member State which requested the OSART. Three copies each of the printed report are sent to the country's Permanent Mission to the United Nations in Vienna, plant management and the regulatory body. The TL also sends electronic copies to both plant management and the regulator.

The IAEA restricts initial distribution to in-house users and to the utility and regulatory authority involved. The report is automatically derestricted after 90 days and published on the IAEA OSART website, unless the Member State indicates otherwise. Most Member States in the interest of improved transparency place the derestricted report on their official public website.

2.6. THE OSART FOLLOW-UP

The OSART follow-up usually takes place 12-18 months after the original mission. The duration of the follow-up mission is 4-5 days, depending on the number of issues identified during the original OSART mission.

The TL determines the number of team members necessary for the mission, usually 1-3 members of the original OSART team, plus the TL and DTL. This number is also dependent on the number of issues identified during the original OSART mission. The TL liaises with the plant and agrees on dates, financing and the contact details of the plant HPP for the follow-up mission.

Approximately three months prior to the follow-up mission, the IAEA produces the relevant format of the Technical Notes for the plant to complete its responses, i.e. the word document of the original report is amended by the addition:

— At the end of the INTRODUCTION AND MAIN CONCLUSIONS section, of a section entitled "[*Plant Name*] Self - Assessment for the Follow-up mission", which the plant completes prior to the mission, and a section entitled "OSART team follow-up main conclusions", which the TL completes at the end of the mission;
— At the end of each issue, after the IAEA Basis, of chapters entitled "Plant Response/Action" (which the plant completes prior to the mission); "IAEA comments" (which the follow-up team members complete following review of the actions taken by the plant on the issue); and "Conclusion" (which is the team's consensus opinion on the extent of resolution of the issue by the plant).

This document is sent to the plant so that it may complete its responses. Once it has been sent back to the IAEA, this document becomes the document used by the TL for the start of the follow-up mission. This document is also sent one month in advance of the mission to all follow-up OSART team members.

At the start of the mission, the team members agree to the review schedule with their counterparts and proceed in determining the status of resolution of the issues in accordance with the definitions of issue status, as indicated below. A team meeting is held each day and the results of the review are discussed and agreed on where relevant. The HPP also participates in this meeting.

An exit meeting is held on the last day of the mission, and this is an opportunity for each team member to formally give the plant his/her findings on each issue.

Following the mission, the Team Leader ensures a full report is prepared in accordance with the standard IAEA format, copies of which will be sent for review and comment to plant/utility/regulatory management, as was the case with the original OSART Report. Three copies each of the printed final report are sent to the country's Permanent Mission to UN in Vienna, plant management and the regulatory body. The TL also sends electronic copies to both plant management and the regulator.

The IAEA assessment of the progress made with the resolution of OSART findings is made, in accordance with the following definitions:

Issue resolved — Recommendation
All necessary actions have been taken to deal with the root causes of the recommendation rather than to just eliminate the facts identified by the team. A management review has been carried out to ensure that actions taken have eliminated the root cause. Actions have also been taken to check that it does not recur. Alternatively, the issue is no longer valid due to, for example, changes in the plant organization.

Satisfactory progress to date — Recommendation
Actions have been taken, including root cause determination, which lead to a high level of confidence that the recommendation will be resolved within a reasonable timeframe, subsequent to the follow-up mission. These actions might include budget commitments, staffing, document preparation, increased or modified training, equipment purchases, etc. This category implies that the recommendation could not reasonably have been resolved prior to the follow-up visit, either due to its complexity or the need for long-term actions. This category also includes recommendations, which have been resolved using temporary or informal methods, or when resolution has only recently taken place and its effectiveness has not been fully assessed.

Insufficient progress to date — Recommendation
Actions taken or planned do not lead to the conclusion that the recommendation will be resolved within a reasonable timeframe. This category includes recommendations in response to which no action has been taken, barring recommendations that have been withdrawn.

Issue resolved — Suggestion
Consideration of the suggestion has been sufficiently thorough. Action plans for improvement have been fully implemented, or the plant has rejected the suggestion for reasons that are acceptable to the follow-up team.

Satisfactory progress to date — Suggestion
Consideration of the suggestion has been sufficiently thorough. Action plans for improvement have been developed but not yet fully implemented.

Insufficient progress to date — Suggestion
Consideration of the suggestion has not been sufficiently thorough. Additional consideration of the suggestion, or strengthening of improvement plans, is necessary.

Issue resolved — Self-identified issue
All necessary actions have been taken, as defined in the plant self-assessment and the corresponding plant action plan, to deal with the root causes of the issue. A management review has been carried out to ensure that actions taken have eliminated the issue. Actions have also been taken to check that it does not recur.

Satisfactory progress to date — Self-identified issue
Actions have been taken, as defined in the plant self-assessment and the corresponding plant action plan, which lead to a high level of confidence that the issue will be resolved within a reasonable timeframe.

Insufficient progress to date — Self-identified issue
The plant action plan developed to resolve the issue was not implemented as expected or did not achieve the expected results.

After the follow-up mission, during preparation of the final report, the detailed facts should be removed from each issue. As a result, each issue will comprise the following:

— The fundamental overall problem;
— Its safety consequence;
— Plant response/actions;
— IAEA comments on plant response;
— Conclusions on the status of resolution.

If a significant number of issues show insufficient progress, it will be recommended to the Member State that an invitation be issued for another follow-up mission one year from then.

3. PRACTICAL TIPS ON OBSERVATIONS FOR REVIEWERS

3.1. INTRODUCTION

The process used to obtain information during the review of operational safety practices in a nuclear power plant should be based on observations, interviews and document reviews, with focus on essential aspects of plant performance.

As far as possible, observations of important activities and facilities should serve as evidence to enable the reviewer assessment of operational safety performance. In the following part of the guidelines, practical tips are provided for performing observations effectively.

3.2. OBSERVATIONS

A fundamental part of the OSART methodology is the observation of ongoing plant activities. The performance of several individuals is likely to be representative of all personnel within a discipline or group. The results of management efforts to implement plant policy and procedures, and the effectiveness of training, are exemplified by these individuals. Therefore, it is inappropriate to treat the conclusions of any observation as a reflection on an individual. Instead, the results of observations should be treated as being characteristic of the functioning of the organization, and the persons involved should remain anonymous.

Each OSART focuses on those aspects of the utility organization that are important in achieving quality and high standards in the end product. Accordingly, the OSART generally concentrates on those activities that the utility has identified as sufficiently important to require the establishment of some system, such as a written document, to control the activity. This system is first evaluated for its adequacy, i.e. the degree to which it incorporates appropriate details and controls to ensure that the desired result is achieved. As a second part of the review process, the team determines whether or not this system has been implemented, i.e. whether the system is in place and actually being utilized by personnel? The final and most important part of the review process is the determination of the quality of the results being achieved by the utility. A significant portion of each review, therefore, is devoted to observing utility personnel performing their day-to-day work. By honing his observation skills, the expert is able to see conditions and situations that are generally symptomatic. Attention to detail is paramount. The expert must have a broad outlook, and be critical of his surroundings and of on-going activities. Information obtained through observation becomes an important component of the basis for the overall review results.

Numerous activities at a plant contain the necessary elements that make an observation worthwhile. In selecting an activity and planning for the observation segment of the review, there are several questions that can be considered to help decide on the most beneficial course of action. Some basic questions, with commentary, include the following:

— Is the system/work important to safety? Observations need not necessarily involve safety related work; however, if the work is safety related or important to safety, the results of the observations will carry considerably more weight. That is, work important to safety should be controlled in a manner that promotes excellence. If deficiencies in this type of work are noted, they may be significant in themselves;

— Is the work of sufficient complexity that a written procedure has been developed? For many of the activities that are observed, a procedure has been developed by the utility to ensure that specific steps are accomplished in a required manner, such that the end product meets a minimum quality standard;
— Does the work involve several departments or disciplines? Although single-discipline observations can be productive, those that require the cooperative effort of several elements of the plant organization often provide a more significant input to the team's effort to evaluate the plant.

In selecting an activity to observe, the expert is looking for performance of an individual that is representative of the utility's ability to train its personnel and implement its policies and procedures. With an appropriate selection of activities, the results of the observations will provide an overall reflection of the utility's performance. Care should be taken not to identify the individual, or the time and location of the observation. This aids in focusing on the symptomatic results rather than the individual.

3.3. CONDUCTING OBSERVATIONS

Preparation

Preparation is the key element of all phases of a review. The two most important parts of the preparation phase are the determination of 'what' and 'when'. The 'what to observe' can be determined by establishing a liaison with the utility to ascertain what activities will be going on during the period of the review. This will enable the expert to plan for specific activities and to conduct the necessary research and study. Other activities will be observed as they arise. The 'when to observe' question is answered best by 'the earlier the better'. By conducting results-oriented observations in the first few days of an OSART, the reviewer gains considerable insight into weaknesses within the organization. This then enables him to properly direct his activities during the remainder of the OSART. The guiding principle for preparation is for the reviewer to read the appropriate IAEA Safety Standards, procedures, codes, regulations and similar documents, prior to observing the work activity.

Observation

Establishing good relationships with the individuals under observation is important. They should understand that the purpose of the observation is not to criticize them personally, but to look for possible improvements as well as good performance. Except in the case of an *immediate hazard* to plant equipment or personnel safety, reviewers should not interfere with plant evolutions. Questions are a necessary part of any observation, but should be asked at appropriate times, when they do not adversely affect the performance of the individual being questioned.

The expert should be looking, in a broad manner, at many items during the observation process. The following illustrate the extent of the desired sphere of interest:

— To what degree does the individual being observed understand the basic objectives and policies of the utility regarding quality work and adherence to procedures?
— What training has the individual received that relates to his activities during this observation?
— What are the industrial safety and material conditions in all areas encountered during this observation?

— Do supervisors monitor the work activity? Do they provide appropriate guidance and training?

Subsequent to observing the work activity, the reviewer organizes his notes and commences analysis of his observations. This process generally results in the need for follow-up action in order to resolve unanswered questions. This follow-up may require a return to the physical area of the plant to confirm initial conclusions or gather further information.

3.4. OBSERVATION TECHNIQUES

— Take detailed notes - sometimes apparently irrelevant material becomes meaningful when analysing and summarizing an evolution;
— Log times when taking notes. These can be used to correlate both plant responses and personnel actions noted by other reviewers in other portions of the plant;
— Include procedure numbers and other reference information for follow-up;
— Include questions and items to follow-up in the notes. Information could be lost if memory is trusted for recall later;
— Include preparatory activities in the observation, if possible. Watch the tagout. Watch how the mechanic gathers tools and parts;
— Do not assume - ask questions. Even if operator A told you the answer, ask operator B. (However, do not entrap people.);
— Constantly ask yourself, ‘Why is the person being observed doing that? Is it the correct thing to do?’ Note details;
— Do not just observe the activity, observe the individual(s) and the surroundings. Look under, over, and around. Think beyond the evolution:
  — Why does the snubber not have oil in it?
  — Why is the wrench in use painted red?
  — Where did that instrument come from?
  — Why does the operator keep changing settings?
  — How many management personnel have I seen?
— Follow up after the evolution is completed. Track paperwork, review the job with supervisors, and question those who performed the task;
— For evolutions of a longer duration, make periodic observations. Several thirty-minute periods spread throughout the day can be more meaningful than one 3-hour period.

4. SPECIFIC GUIDELINES

4.1. LEADERSHIP AND MANAGEMENT FOR SAFETY

The safe and reliable conduct of a nuclear power plant implies the management of numerous activities in various areas - including nuclear safety, health, the environment, security, quality, industrial safety - and of social and economic elements. All these elements must be integrated in a management system to ensure that safety is not compromised and remains the first priority. Senior management shall establish, implement and continuously improve this integrated management system, and shall determine and provide the competences and (human and other) resources necessary to carry out the activities of the organization.

The integrated management system shall also describe responsibilities, lines of authority within the organization, and interfaces with external organizations.

The Leadership and Management for Safety evaluation includes a review of the effectiveness of the integrated management system in ensuring and enhancing safety.

During the review, appropriate attention should be paid to special features of local culture, which may have a strong influence on management practices.

References

[SSR-2/2; GSR part 2; GSR part 4; GS-G-3.1; GS-G-3.5; NS-G-2.4; NS-G-2.8]

Expectations

The operating organization shall have the prime responsibility for safety in the operation of a nuclear power plant. (SSR-2/2 Requirement 1).

The operating organization shall establish, implement, assess and continually improve an integrated management system. (SSR-2/2 Requirement 2).

The structure of the operating organization, and functions, roles and responsibilities of its personnel, shall be established and documented. (SSR-2/2 Requirement 3).

The operating organization shall be staffed with competent managers and sufficient qualified personnel for the safe operation of the plant. (SSR-2/2 Requirement 4).

The operating organization shall establish and implement operational polices that give safety highest priority. (SSR-2/2 Requirement 5).

The operating organization shall ensure that all activities that may affect safety are performed by suitably qualified and competent persons. (SSR-2/2 Requirement 7).

The operating organization shall ensure that safety related activities are adequately analysed and controlled to ensure that the risks associated with harmful effects of ionizing radiation are kept as low as reasonably achievable. (SSR-2/2 Requirement 8).

The operating organization shall establish a system for continuous monitoring and periodic review of the safety of the plant and of the performance of the operating organization. (SSR-2/2 Requirement 9).

The operating organization shall establish and implement a programme to manage modifications. (SSR-2/2 Requirement 10).

The operating organization shall ensure that a systematic assessment is carried out to provide reliable confirmation that safety related items are capable of the required performance for all operational states and for accident conditions. (SSR-2/2 Requirement 13).

The operating organization shall establish and maintain a system for the control of records and reports. (SSR-2/2 Requirement 15).

The operating organization shall ensure that the implementation of safety requirements and security requirements satisfies both safety objectives and security objectives. (SSR-2/2 Requirement 17).

The operating organization shall establish and implement a programme to ensure that safety related risks associated with non-radiation-related hazards to personnel involved in activities at the plant are kept as low as reasonably achievable. (SSR-2/2 Requirement 23).

The operating organization shall establish an operating experience programme to learn from events at the plant, and events in the nuclear industry and other industries worldwide. (SSR-2/2 Requirement 24).

Senior management shall give an overriding priority to achieving the fundamental safety objective of protecting people and the environment against radiation risks. (GSR part 2 Requirement 3).

Senior management shall establish, implement and continuously improve an effective integrated management system to ensure safety. (GSR part 2 Requirement 4)

Interactions with interested parties shall be integrated into the management system. (GSR part 2 Requirement 5).

The management system shall integrate all elements of management, including safety, health, environmental, security, quality, as well as social and economic elements, so that safety is not compromised. (GSR part 2 Requirement 6).

Application of the management system requirements shall be graded for each activity and process relating to safety. (GSR part 2 Requirement 7).

The management system shall be documented. (GSR part 2 Requirement 8).

Senior management shall determine and provide the competences and resources necessary to carry out the activities of the organization, so as to achieve safety and to enhance safety performance. (GSR part 2 Requirement 9).

Processes and activities shall be developed and managed so as to achieve safety. (GSR part 2 Requirement 10).

The organization shall put in place arrangements with suppliers to specify, monitor and control the supply of items, products and services that may affect safety. (GSR part 2 Requirement 11).

Measurement, assessment and evaluation of the management system shall be performed in order to enhance safety performance. (GSR part 2 Requirement 12).

A graded approach shall be used in determining the scope and level of detail of the safety assessment carried out in a particular State for any particular facility or activity, consistent with the magnitude of the possible radiation risks arising from the facility or activity. (GSR part 4 Requirement 1).

Evaluations

Agreed Working Note Outlines (available at http://www-ns.iaea.org/tech-areas/operational-safety, in domain of OSART missions).

4.2. TRAINING AND QUALIFICATION

To achieve and maintain high safety standards, nuclear power plants are required to be staffed by an adequate number of highly qualified and experienced personnel. To establish and maintain a high level of personnel competence, appropriate training and qualification programmes should be established at the plant and kept under constant review, to ensure their relevance to staff needs. It is the responsibility of the operating organization to ensure that all plant personnel receive appropriate training, and that only personnel with suitable qualifications are assigned job functions at the nuclear plant. During employment, qualifications are maintained by participation in continuing training programmes that are directed towards maintaining and upgrading the knowledge and skills of personnel.

References

[SSR-2/2; NS-G-2.3; NS-G-2.6; NS-G-2.8; NS-G-2.12; NS-G-2.14; GS-G-3.1; SSG-3; SSG-25]

Expectations

The operating organization shall have the prime responsibility for safety in the operation of a nuclear power plant. (SSR-2/2 Requirement 1).

The structure of the operating organization, and the functions, roles and responsibilities of its personnel, shall be established and documented. (SSR-2/2 Requirement 3).

The operating organization shall be staffed with competent managers and sufficient qualified personnel for the safe operation of the plant. (SSR-2/2 Requirement 4)

The operating organization shall establish and implement operational polices that give safety the highest priority. (SSR-2/2 Requirement 5).

The operating organization shall ensure that all activities that may affect safety are performed by suitably qualified and competent persons. (SSR-2/2 Requirement 7).

The operating organization shall establish and implement a system for plant configuration management to ensure consistency between design requirements, physical configuration and plant documentation. (SSR-2/2 Requirement 10).

The operating organization shall establish and implement a programme to manage modifications. (SSR-2/2 Requirement 11).

Systematic safety assessments of the plant, in accordance with regulatory requirements, shall be performed by the operating organization throughout the plant's operating lifetime, with due account taken of operating experience and significant new safety related information from all relevant sources. (SSR-2/2 Requirement 12).

The operating organization shall establish and maintain a system for the control of records and reports. (SSR-2/2 Requirement 15).

The operating organization shall establish an operating experience programme to learn from events at the plant, and events in the nuclear industry and other industries worldwide. (SSR-2/2 Requirement 24).

The operating organization shall ensure that effective programmes for maintenance, testing, surveillance and inspection are established and implemented. (SSR-2/2 Requirement 31).

Evaluations

Agreed Working Note Outlines (available at http://www-ns.iaea.org/tech-areas/operational-safety, in domain of OSART missions).

4.3. OPERATIONS

Operations involves activities that provide supervision of the operating group which controls safe plant operation. The main function of operations is to run the plant safely and efficiently while adhering to approved procedures, operational limits and conditions (OLCs) and other regulatory requirements. Through its conduct of operations, the operating group has a direct impact on the operation of the reactor and associated components and systems. While the structure of the group varies according to the specific plant or utility, the group is normally composed of shift crews and supporting staff, and is usually managed by an appointed head of operations. The shift supervisor manages plant operations on each shift. In addition to this, for the purpose of defining review responsibilities in these guidelines, operations covers operations facilities, operator aids, work authorizations, fire protection and accident conditions.

References

[SSR-2/2; NS-G-2.1; NS-G-2.2; NS-G-2.4; NS-G-2.5; NS-G-2.6; NS-G-2.8; NS-G-2.14; GS-G-3.1; RS-G-1.1; SSG-3; SSG-25]

Expectations

The operating organization shall have the prime responsibility for safety in the operation of a nuclear power plant. (SSR-2/2 Requirement 1).

The structure of the operating organization, and the functions, roles and responsibilities of its personnel, shall be established and documented. (SSR-2/2 Requirement 3).

The operating organization shall be staffed with competent managers and sufficient qualified personnel for the safe operation of the plant. (SSR-2/2 Requirement 4).

The operating organization shall establish and implement operational polices that give safety the highest priority. (SSR-2/2 Requirement 5).

The operating organization shall ensure that the plant is operated in accordance with the set of operational limits and conditions. (SSR-2/2 Requirement 6).

The operating organization shall ensure that all activities that may affect safety are performed by suitably qualified and competent persons. (SSR-2/2 Requirement 7).

The operating organization shall ensure that safety related activities are adequately analysed and controlled to ensure that the risks associated with the harmful effects of ionizing radiation are kept as low as reasonably achievable. (SSR-2/2 Requirement 8).

The operating organization shall establish and implement a system for plant configuration management to ensure consistency between design requirements, physical configuration and plant documentation. (SSR-2/2 Requirement 10).

The operating organization shall make arrangements for ensuring fire safety. (SSR-2/2 Requirement 22).

The operating organization shall establish and implement a programme to ensure that safety related risks associated with non-radiation-related hazards to personnel involved in activities

at the plant are kept as low as reasonably achievable (SSR-2/2 Requirement 23).

The operating organization shall establish an operating experience programme to learn from events at the plant, and events in the nuclear industry and other industries worldwide (SSR-2/2 Requirement 24).

The operating procedures shall be developed that apply comprehensively (for the reactor and its associated facilities) for normal operation, anticipated operational occurrences and accident conditions, in accordance with the policy of the operating organization and the requirements of the regulatory body (SSR-2/2 Requirement 26).

The operating organization shall ensure that operations control rooms and control equipment are maintained in a suitable condition. (SSR-2/2 Requirement 27).

The operating organization shall develop and implement programmes to maintain a high standard of material condition, housekeeping and cleanliness in all working areas (SSR-2/2 Requirement 28).

The operating organization shall be responsible and shall make arrangements for all activities associated with core management and with on-site fuel handling. (SSR-2/2 Requirement 30).

Evaluations

Agreed Working Note Outlines (available at http://www-ns.iaea.org/tech-areas/operational-safety, in domain of OSART missions).

4.4. MAINTENANCE

Nuclear installations must be regularly inspected, tested and maintained in accordance with approved procedures to ensure that structures, systems and components continue to be available and to operate as intended, and retain their capability to meet the design objectives and requirements of the safety analysis. The operating organization shall prepare and implement a programme of maintenance, testing, surveillance and inspection of those structures, systems and components which are important to safety.

For the purpose of these guidelines, maintenance covers in-service inspection, spare parts, materials and outage management.

References

[SSR-2/2; GS-R-3; NS-G-2.1; NS-G-2.3; NS-G-2.4; NS-G-2.5; NS-G-2.6; NS-G-2.7; NS-G-2.8; NS-G-2.11; NS-G-2.12; NS-G-2.14; GS-G-3.1; GS-G-3.5; SSG-3; SSG-25]

Expectations

The operating organization shall have the prime responsibility for safety in the operation of a nuclear power plant (SSR-2/2 Requirement1).

The structure of the operating organization, and the functions, roles and responsibilities of its personnel, shall be established and documented (SSR-2/2 Requirement 3).

The operating organization shall be staffed with competent managers and sufficient qualified personnel for the safe operation of the plant (SSR-2/2 Requirement 4).

The operating organization shall establish and implement operational polices that give safety the highest priority (SSR-2/2 Requirement 5).

The operating organization shall ensure that all activities that may affect safety are performed by suitably qualified and competent persons. (SSR-2/2 Requirement 7).

The operating organization shall ensure that safety related activities are adequately analysed and controlled to ensure that the risks associated with the harmful effects of ionizing radiation are kept as low as reasonably achievable (SSR-2/2 Requirement 8).

The operating organization shall establish a system for continuous monitoring and periodic review of the safety of the plant and of the performance of the operating organization (SSR-2/2 Requirement 9).

The operating organization shall establish and implement a system for plant configuration management to ensure consistency between design requirements, physical configuration and plant documentation (SSR-2/2 Requirement 10).

The operating organization shall establish and implement a programme to manage modifications (SSR-2/2 Requirement 11).

Systematic safety assessment of the plant, in accordance with regulatory requirements, shall be performed by the operating organization throughout the plant's operating lifetime, with

due account taken of operating experience and significant new safety related information from all relevant sources (SSR-2/2 Requirement 12).

The operating organization shall ensure that an effective ageing management programme is implemented to ensure that required safety functions of systems, structures and components are fulfilled over the entire operating lifetime of the plant. (SSR-2/2 Requirement 14).

The operating organization shall establish and maintain a system for the control of records and reports. (SSR-2/2 Requirement 15).

The operating organization shall establish and implement a radiation protection programme. (SSR-2/2 Requirement 20).

The operating organization shall establish an operating experience programme to learn from events at the plant, and events in the nuclear industry and other industries worldwide. (SSR-2/2 Requirement 24).

The operating organization shall develop and implement programmes to maintain a high standard of material condition, housekeeping and cleanliness in all work areas. (SSR-2/2 Requirement 28).

The operating organization shall ensure that effective programmes for maintenance, testing, surveillance and inspection are established and implemented. (SSR-2/2 Requirement 31).

The operating organization shall establish and implement arrangements to ensure the effective performance, planning and control of work activities during outages. (SSR-2/2 Requirement 32).

Evaluations

Agreed Working Note Outlines (available at http://www-ns.iaea.org/tech-areas/operational-safety, in domain of OSART missions).

4.5. TECHNICAL SUPPORT

Technical support covers all the on-site activities of the technical and engineering groups involved in safety assessment, surveillance testing, plant performance monitoring, plant modifications, reactor engineering, fuel handling, and application of plant process computers. The integration of technical support - with its specialist functions - into the plant organization is important in order to support and ensure the safe operation of the nuclear power plant.

References

[SSR-2/2; GSR part 4; NS-G-1.1; NS-G-2.1; NS-G-2.2; NS-G-2.3; NS-G-2.4; NS-G-2.5; NS-G-2.6; NS-G-2.8; NS-G-2.12; NS-G-2.14; SSG-2; SSG-3; SSG-25; GS-G-4.1; Safety Reports Series No.3]

Expectations

The operating organization shall have the prime responsibility for safety in the operation of a nuclear power plant (SSR-2/2 Requirement 1).

The structure of the operating organization, and the functions, roles and responsibilities of its personnel, shall be established and documented (SSR-2/2 Requirement 3).

The operating organization shall be staffed with competent managers and sufficient qualified personnel for the safe operation of the plant (SSR-2/2 Requirement 4).

The operating organization shall establish and implement operational policies that give safety the highest priority (SSR-2/2 Requirement 5).

The operating organization shall ensure that all activities that may affect safety are performed by suitably qualified and competent persons (SSR-2/2 Requirement 7).

The operating organization shall ensure that safety related activities are adequately analysed and controlled to ensure that the risks associated with the harmful effects of ionizing radiation are kept as low as reasonable achievable (SSR-2/2 Requirement 8).

The operating organization shall establish a system for continuous monitoring and periodic review of the safety of the plant and of the performance of the operating organization (SSR-2/2 Requirement 9).

The operating organization shall establish and implement a system for plant configuration management to ensure consistency between design requirements, physical configuration and plant documentation (SSR-2/2 Requirement 10).

The operating organization shall establish and implement a programme to manage modifications (SSR-2/2 Requirement 11).

Systematic safety assessment of the plant, in accordance with regulatory requirements, shall be performed by the operating organization throughout the plant's lifetime, with due account taken of operating experience and significant new safety related information from all relevant sources (SSR-2/2 Requirement 12).

The operating organization shall ensure that a systematic assessment is carried out to provide

reliable confirmation that safety related items are capable of the required performance for all operational states and for accident conditions (SSR-2/2 Requirement 13).

The operating organization shall ensure that an effective ageing management programme is implemented to ensure that required safety functions of systems, structures and components are fulfilled over the entire operating lifetime of the plant (SSR-2/2 Requirement 14).

The operating organization shall establish and maintain a system for the control of records and reports (SSR-2/2 Requirement 15).

Where applicable, the operating organization shall establish and implement a comprehensive programme for ensuring the long term safe operation of the plant beyond a timeframe established in the license conditions, design limits, safety standards and/or regulations (SSR-2/2 Requirement 16).

The operating organization shall ensure that the implementation of safety requirements and security requirements satisfies both safety objectives and security objectives (SSR-2/2 Requirement 17).

The operating organization shall make arrangements for ensuring fire safety (SSR-2/2 Requirement 22).

The operating procedures shall be developed that apply comprehensively (for the reactor and its associated facilities) for normal operation, anticipated operational occurrences and accident conditions, in accordance with the policy of the operating organization and the requirements of the regulatory body (SSR-2/2 Requirement 26).

The operating organization shall be responsible and shall make arrangements for all activities associated with core management and with on-site fuel handling. (SSR-2/2 Requirement 30)

The operating organization shall ensure that effective programmes for maintenance, testing, surveillance and inspection are established and implemented (SSR-2/2 Requirement 31).

A graded approach shall be used in determining the scope and level of detail of the safety assessment carried out in a particular State for any particular facility or activity, consistent with the magnitude of the possible radiation risks arising from the facility or activity (GSR part 4 Requirement 1).

The responsibility for carrying out the safety assessment shall rest with the responsible legal person; that is, the person or organization responsible for the facility or activity (GSR part 4 Requirement 3).

The possible radiation risks associated with the facility or activity shall be identified and assessed (GSR part 4 Requirement 6).

All safety functions associated with a facility or activity shall be specified and assessed (GSR part 4 Requirement 7).

It shall be determined in the safety assessment for a facility or activity whether adequate measures are in place to protect people and the environment from the harmful effects of ionizing radiation (GSR part 4 Requirement 9).

Human interactions with the facility or activity shall be addressed in the safety assessment, and it shall be determined whether the procedures and safety measures that are provided for all normal operational activities, in particular those that are necessary for implementation of the operational limits and conditions, and those that are required in response to anticipated operational occurrences and accidents, ensure an adequate level of safety (GSR part 4 Requirement 11).

Both deterministic and probabilistic approaches shall be included in the safety analysis (GSR part 4 Requirement 15).

The safety assessment shall be periodically reviewed and updated (GSR part 4 Requirement 24).

Evaluations

Agreed Working Note Outlines (available at http://www-ns.iaea.org/tech-areas/operational-safety, in domain of OSART missions).

4.6. OPERATIONAL EXPERIENCE FEEDBACK

A well implemented operational experience (OE) programme is characterized by the following features: management aligns the organization to effectively implement the OE programme in order that plant safety and reliability are improved; OE is reported in a timely manner to reduce the potential for recurring events in-house and in the industry; sources of OE are considered in the OE programme to improve plant safety and reliability from lessons learned; OE information is appropriately screened to select and prioritize those items requiring further investigation; analysis is performed for appropriate events, depending on their severity or frequency, to ensure root causes and corrective actions are identified; corrective actions are defined, prioritized, scheduled and followed up to ensure effective implementation and effective improvement of plant safety and reliability; OE information is used throughout the plant to effectively improve plant safety and reliability; OE information is analysed and trended, and results are used to improve plant safety and reliability; assessments and indicators are effectively used to review and monitor plant performance and the effectiveness of the OE programme.

The review of an OE programme is a cross-functional process. Therefore, any input from the reviewers of other review areas is beneficial to support the review of the OE programme.

References:

[SSR-2/2; NS-G-2.4; NS-G-2.11; GS-G-3.1; GS-G-3.5]

Expectations:

The operating organization shall have the prime responsibility for safety in the operation of a nuclear power plant (SSR-2/2 Requirement 1).

The structure of the operating organization, and the functions, roles and responsibilities of its personnel, shall be established and documented (SSR-2/2 Requirement 3).

The operating organization shall ensure that all activities that may affect safety are performed by suitably qualified and competent persons (SSR-2/2 Requirement 7).

The operating organization shall establish a system for continuous monitoring and periodic review of the safety of the plant and of the performance of the operating organization (SSR-2/2 Requirement 9).

Systematic safety assessments of the plant, in accordance with regulatory requirements, shall be performed by the operating organization throughout the plant's operating lifetime, with due account taken of operating experience and significant new safety related information from all relevant sources (SSR-2/2 Requirement 12).

The operating organization shall establish an operating experience programme to learn from events at the plant, and events in the nuclear industry and other industries worldwide (SSR-2/2 Requirement 24).

Evaluations

Agreed Working Note Outlines (available at http://www-ns.iaea.org/tech-areas/operational-safety, in domain of OSART missions).

4.7. RADIATION PROTECTION

The radiation protection (RP) regime established and implemented by the operating organization at a nuclear power plant should ensure that in all operational states, doses due to exposure to ionizing radiation in the plant or due to any planned releases of radioactive material from the plant are kept below prescribed limits and are ALARA. RP controls during operation of the plant, including the management of radioactive effluents and waste arising from the plant, should be directed not only at protecting workers and members of the public from radiation exposure, but also at preventing or reducing potential exposures and mitigating their potential consequences.

References

[SSR-2/2; GSR part 3; NS-G-2.3; NS-G-2.4; NS-G-2.5; NS-G-2.6; NS-G-2.7; NS-G-2.8; NS-G-2.11; NS-G-2.12; RS-G-1.1; RS-G-1.2; RS-G-1.3; RS-G-1.8; SSG-3; SSG-25]

Expectations

The operating organization shall have prime responsibility for safety in the operation of a nuclear power plant. (SSR-2/2 Requirement 1).

The structure of the operating organization, and the functions, roles and responsibilities of its personnel, shall be established and documented. (SSR-2/2 Requirement 3).

The operating organization shall be staffed with competent managers and sufficient qualified personnel for the safe operation of the plant. (SSR-2/2 Requirement 4).

The operating organization shall establish and implement operational policies that give safety the highest priority. (SSR-2/2 Requirement 5).

The operating organization shall ensure that all activities that may affect safety are performed by suitably qualified and competent persons. (SSR-2/2 Requirement 7).

The operating organization shall establish a system for continuous monitoring and periodic review of the safety of the plant and of the performance of the operating organization. (SSR-2/2 Requirement 9).

The operating organization shall establish and maintain a system for the control of records and reports. (SSR-2/2 Requirement 15).

The operating organization shall prepare an emergency plan for preparedness for, and response to, a nuclear or radiological emergency. (SSR-2/2 Requirement 18).

The operating organization shall establish and implement a radiation protection programme. (SSR-2/2 Requirement 20).

The operating organization shall establish and implement a programme for the management of radioactive waste. (SSR-2/2 Requirement 21).

The operating organization shall establish an operating experience programme to learn from events at the plant, and events in the nuclear industry and other industries worldwide. (SSR-2/2 Requirement 24).

The operating organization shall ensure that effective programmes for maintenance, testing, surveillance and inspection are established and implemented. (SSR-2/2 Requirement 31).

Parties with responsibilities for protection and safety shall ensure that the principles of radiation protection are applied for all exposure situations. (GSR part 3 Requirement 1).

Registrants and licensees shall be responsible for protection and safety in planned exposure situations. (GSR part 3 Requirement 9).

Registrants and licensees and employers shall conduct monitoring to verify compliance with the requirements for protection and safety. (GSR part 3 Requirement 14).

Registrants and licensees shall conduct formal investigations of abnormal conditions arising in the operation of facilities or the conduct of activities, and shall disseminate information that is significant for protection and safety. (GSR part 3 Requirement 16).

Registrants and licensees shall ensure the safety of radiation generators and radioactive sources. (GSR part 3 Requirement 17).

Employers, registrants and licensees shall be responsible for the protection of workers against occupational exposure. Employers, registrants and licensees shall ensure that protection and safety is optimized and that the dose limits for occupational exposure are not exceeded (GSR part 3 Requirement 21).

Workers shall fulfil their obligations and carry out their duties for protection and safety (GSR part 3 Requirement 22).

Employers and registrants and licensees shall cooperate to the extent necessary for compliance by all responsible parties with the requirements for protection and safety (GSR part 3 Requirement 23).

Employers, registrants and licensees shall establish and maintain organizational, procedural and technical arrangements for the designation of controlled areas and supervised areas, for local rules and for monitoring of the workplace, in a radiation protection programme for occupational exposure (GSR part 3 Requirement 24).

Employers, registrants and licensees shall be responsible for making arrangements for assessment and recording of occupational exposure and for workers' health surveillance (GSR part 3 Requirement 25).

Employers, registrants and licensees shall provide workers with adequate information, instruction and training for protection and safety (GSR part 3 Requirement 26).

Employers, registrants and licensees shall make special arrangements for female workers, as necessary, for protection of the embryo or foetus and of breastfed infants. Employers, registrants and licensees shall make special arrangements for protection and safety for persons under 18 years of age who are undergoing training (GSR part 3 Requirement 28).

Relevant parties shall apply the system of protection and safety to protect members of the public against exposure (GSR part 3 Requirement 30).

Relevant parties shall ensure that radioactive waste and discharges of radioactive material to the environment are managed in accordance with the authorization (GSR part 3 Requirement 31).

The regulatory body and relevant parties shall ensure that programmes for source monitoring and environmental monitoring are in place, and that the results from the monitoring are recorded and are made available (GSR part 3 Requirement 32).

Evaluations

Agreed Working Note Outlines (available at http://www-ns.iaea.org/tech-areas/operational-safety, in domain of OSART missions).

4.8. CHEMISTRY

Chemistry involves activities of chemical treatment to maintain the integrity of the barriers retaining radioactivity, including fuel cladding and the primary circuit. Chemistry activities have a direct impact in limiting all kinds of corrosion processes causing either direct breaches of safety barriers or their weakening, so that failure could occur during a transient.

In addition, chemical treatment includes consideration of its effects on the out-of-core radiation fields that in turn influence radiation doses to which workers are exposed, as well as the external impact in case of a severe accident. Plant radiochemistry is included in the chemistry considerations for the purpose of these guidelines.

References:

[SSR-2/2; GSR part 3; NS-G-2.3; NS-G-2.4; NS-G-2.11; GS-G-4.1; SSG-3]

Expectations:

The operating organization shall have the prime responsibility for safety in the operation of a nuclear power plant (SSR-2/2 Requirement 1).

The structure of the operating organization, and the functions, roles and responsibilities of its personnel, shall be established and documented (SSR-2/2 Requirement 3).

The operating organization shall be staffed with competent managers and sufficient qualified personnel for the safe operation of the plant (SSR-2/2 Requirement 4).

The operating organization shall ensure that the plant is operated in accordance with the set of operational limits and conditions (SSR-2/2 Requirement 6).

The operating organization shall ensure that all activities that may affect safety are performed by suitably qualified and competent persons (SSR-2/2 Requirement 7).

The operating organization shall ensure that safety related activities are adequately analysed and controlled to ensure that the risks associated with the harmful effects of ionizing radiation are kept as low as reasonably achievable (SSR-2/2 Requirement 8).

The operating organization shall establish a system for continuous monitoring and periodic review of the safety of the plant and of the performance of the operating organization (SSR-2/2 Requirement 9).

The operating organization shall establish and implement a system for plant configuration management to ensure consistency between design requirements, physical configuration and plant documentation (SSR-2/2 Requirement 10).

The operating organization shall establish and implement a programme to manage modifications (SSR-2/2 Requirement 11)

Systematic safety assessments of the plant, in accordance with regulatory requirements, shall be performed by the operating organization throughout the plant's operating lifetime, with due account taken of operating experience and significant new safety related information from all relevant sources (SSR-2/2 Requirement 12).

The operating organization shall ensure that an effective ageing management programme is implemented to ensure that required safety functions of systems, structures and components are fulfilled over the entire operating lifetime of the plant. (SSR-2/2 Requirement 14).

The operating organization shall establish and maintain a system for the control of records and reports (SSR-2/2 Requirement 15).

The operating organization shall establish and implement a programme for the management of radioactive waste. (SSR-2/2 Requirement 21).

The operating organization shall establish an operating experience programme to learn from events at the plant, and events in the nuclear industry and other industries worldwide (SSR-2/2 Requirement 24).

Operating procedures shall be developed that apply comprehensively (for the reactor and its associated facilities) for normal operation, anticipated operational occurrences and accident conditions, in accordance with the policy of the operating organization and the requirements of the regulatory body (SSR-2/2 Requirement 26).

The operating organization shall establish and implement a programme to provide the necessary support for chemistry and radiochemistry (SSR-2/2 Requirement 29).

The operating organization shall be responsible and shall make arrangements for all activities associated with core management and with on-site fuel handling (SSR-2/2 Requirement 30).

Relevant parties shall ensure that radioactive waste and discharges of radioactive material to the environment are managed in accordance with the authorization (GSR part 3 Requirement 31).

Evaluations

Agreed Working Note Outlines (available at http://www-ns.iaea.org/tech-areas/operational-safety, in domain of OSART missions).

4.9. EMERGENCY PREPAREDNESS AND RESPONSE

Emergency preparedness is the capability to take actions that will effectively mitigate the consequences of an emergency threatening human life, health, property and the environment. The goal of emergency preparedness is to ensure that an adequate capability is in place for a timely, managed, controlled, co-ordinated and effective response to an emergency at operator, local, regional, national and, as appropriate, international level. Emergency response is the performance of those actions. The goals of emergency response[1] can only be achieved by having sound emergency preparedness in place as part of the overall infrastructure for protection and safety.

This section refers to the onsite emergency arrangements[2] of the nuclear plant that is the subject of the review. Off-site emergency preparedness and response arrangements are not within the scope of this assessment, except for the interface between the operating organization and the offsite emergency response authorities. A further, off-site review may be done on a case-by-case basis, depending on the scope defined in the request for an OSART Review; however, offsite reviews normally fall within the scope of an Emergency Preparedness Review (EPREV) mission.

The requirements of GSR Part 7, which constitute the basis for the expectations below, are addressed for the most part to the government. In the present context, they need to be interpreted in terms of the expectations, and within the scope of the authority of the operating organization.

References:

[GSR Part 7, SSR-2/2; GSR part 2; NS-G-2.4; NS-G-2.8: NS-G-2.14; GS-G-2.1; GSG-2; GS-G-4.1; RS-G-1.1; SSG-3; SSG-4; SSG-25]

Expectations

The operating organization shall have the prime responsibility for safety in the operation of a nuclear power plant. (SSR-2/2 Requirement 1).

The government shall make provisions to ensure that roles and responsibilities for preparedness and response for a nuclear or radiological emergency are clearly specified and assigned. The operating organization shall establish and maintain arrangements for on-site preparedness and response for a nuclear or radiological emergency for facilities or activities under its responsibility, in accordance with the applicable requirements. The operating organization shall demonstrate that, and shall provide the regulatory body with an assurance that, emergency arrangements are in place for an effective response on the site to a nuclear or radiological emergency, in relation to the facility or the activity under its responsibility. (GSR Part 7, Requirement 2).

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[1] Defined in GSR Part 7.

[2] The integrated set of infrastructural elements necessary to provide the capability for performing a specified function or task required in response to a nuclear or radiological emergency. These elements may include authorities and responsibilities, organization, coordination, personnel, plans, procedures, facilities, equipment or training. [GSR Part 7]

The government shall ensure that a hazard assessment is performed to provide a basis for a graded approach in preparedness and response for a nuclear or radiological emergency. (GSR Part 7, Requirement 4)

Systematic safety assessments of the plant, in accordance with regulatory requirements, shall be performed by the operating organization throughout the plant's operating lifetime, with due account taken of operating experience and significant new safety related information from all relevant sources. (SSR-2/2 Requirement 12)

The safety assessment shall be periodically reviewed and updated. (GSR part 4, Requirement 24).

The government shall ensure that protection strategies are developed, justified and optimized at the preparedness stage for taking protective actions and other response actions effectively in a nuclear or radiological emergency. (GSR Part 7, Requirement 5).

The government shall ensure that arrangements are in place for emergency response operations to be appropriately managed. (GSR Part 7, Requirement 6).

The government shall ensure that arrangements are in place for the prompt identification and notification of a nuclear or radiological emergency, and for the activation of an emergency response. (GSR Part 7, Requirement 7).

The government shall ensure that arrangements are in place for taking mitigatory actions in a nuclear or radiological emergency. (GSR Part 7, Requirement 8).

The government shall ensure that arrangements are in place to assess emergency conditions and to take urgent protective actions and other response actions effectively in a nuclear or radiological emergency. (GSR Part 7, Requirement 9)

The government shall ensure that arrangements are in place to provide members of the public who are affected or are potentially affected by a nuclear or radiological emergency with information that is necessary for their protection, to warn them promptly and to instruct them on actions to be taken (GSR Part 7, Requirement 10).

The government shall ensure that arrangements are in place to protect emergency workers and to protect helpers in an emergency (GSR Part 7, Requirement 11).

The government shall ensure that arrangements are in place for the provision of appropriate medical screening and triage, medical treatment, and longer term medical actions for those people who could be affected in a nuclear or radiological emergency (GSR Part 7, Requirement 12).

The government shall ensure that arrangements are in place and are implemented for the termination of a nuclear or radiological emergency (GSR Part 7, Requirement 18).

The government shall ensure that any nuclear or radiological emergency and corresponding emergency response are analysed in order to identify actions to be taken to prevent other emergencies and to improve emergency arrangements (GSR Part 7, Requirement 19).

The government shall ensure that the overall organization for emergency preparedness and response is clearly specified and staffed with sufficient personnel who are qualified and fit for

their intended duty. (GSR Part 7, Requirement 21) The structure of the operating organization, and the functions, roles and responsibilities of its personnel, shall be established and documented. (SSR-2/2 Requirement 3) The operating organization shall be staffed with competent managers and sufficient qualified personnel for the safe operation of the plant (SSR-2/2 Requirement 4).

The government shall ensure that arrangements are in place for the coordination of emergency preparedness and response between the operating organization and local, regional and national authorities, and, where appropriate, at international level (GSR Part 7, Requirement 22).

The government shall ensure that plans and procedures necessary for effective emergency response are established. (GSR Part 7, Requirement 23) The operating organisation shall prepare an emergency plan for preparedness for, and response to, a nuclear or radiological emergency (SSR-2/2 Requirement 18).

The government shall ensure that adequate logistical support and facilities are provided to enable emergency response functions to be performed effectively (GSR Part 7, Requirement 24).

The government shall ensure that personnel relevant for emergency response shall take part in regular training, drills and exercises to ensure that they are able to perform their assigned response functions effectively in a nuclear or radiological emergency (GSR Part 7, Requirement 25).

The government shall ensure that a programme is established within integrated management systems to ensure the availability and reliability of all supplies, equipment, communication systems and facilities, plans, procedures and other arrangements necessary for effective response in a nuclear or radiological emergency (GSR Part 7, Requirement 26).

The operating organization shall establish a system for continuous monitoring and periodic review of the safety of the plant and of the performance of the operating organization (SSR-2/2 Requirement 9).

Evaluations

Agreed Working Note Outlines (available at http://www-ns.iaea.org/tech-areas/operational-safety, in domain of OSART missions).

4.10. ACCIDENT MANAGEMENT

Consideration of accidents more severe than the design basis accidents at nuclear power plants is an essential component of the defence-in-depth approach used in ensuring nuclear safety. The probability of occurrence of such accidents is very low but such an accident may lead to significant consequences. The objective of accident management is to prevent accidents that can lead to fuel damage, or to terminate the progress of fuel damage once it has started, maintain the integrity of the containment for as long as possible, minimize releases of radioactive material and achieve a long-term stable state. Therefore, accident management procedures and guidelines that take into account representative and dominant severe accident scenarios, and specify the measures to mitigate the consequences of accidents that exceed the design limits, are an integral part of nuclear safety. A training programme that includes the periodic confirmation of the competence of personnel involved in severe accident management is also expected.

References

[SSR-2/2; GSR part 4; NS-G-2.3; NS-G-2.8; NS-G-2.14; NS-G-2.15; GS-G-4.1; SSG-3; SSG-4; SSG-25]

Expectations

The operating organization shall have the prime responsibility for safety in the operation of a nuclear power plant. (SSR-2/2 Requirement 1).

The operating organization shall be staffed with competent managers and sufficient qualified personnel for the safe operation of the plant. (SSR-2/2 Requirement 4).

The operating organization shall ensure that the plant is operated in accordance with a set of operational limits and conditions. (SSR-2/2 Requirement 6).

The operating organization shall ensure that all activities that may affect safety are performed by suitably qualified and competent persons. (SSR-2/2 Requirement 7).

The operating organization shall establish a system for continuous monitoring and periodic review of the safety of the plant and of the performance of the operating organization. (SSR-2/2 Requirement 9).

The operating organization shall establish and implement a system for plant configuration management to ensure consistency between design requirements, physical configuration and plant documentation. (SSR-2/2 Requirement 10).

The operating organization shall establish and implement a programme to manage modifications. (SSR-2/2 Requirement 11).

Systematic safety assessments of the plant, in accordance with regulatory requirements, shall be performed by the operating organization throughout the plant's operating lifetime, with due account taken of operating experience and significant new safety related information from all relevant sources. (SSR-2/2 Requirement 12).

The operating organization shall prepare an emergency plan for preparedness for, and response to, a nuclear or radiological emergency (SSR-2/2 Requirement 18).

The operating organization shall establish, and shall periodically review and as necessary revise, an accident management programme (SSR-2/2 Requirement 19).

The operating organization shall establish an operating experience programme to learn from events at the plant, and events in the nuclear industry and other industries worldwide (SSR-2/2 Requirement 24).

Operating procedures shall be developed that apply comprehensively (for the reactor and its associated facilities) for normal operation, anticipated operational occurrences and accident conditions, in accordance with the policy of the operating organization and the requirements of the regulatory body (SSR-2/2 Requirement 26).

The operating organization shall ensure that effective programmes for maintenance, testing, surveillance and inspection are established and implemented (SSR-2/2 Requirement 31).

The primary purposes of the safety assessment shall be to determine whether an adequate level of safety has been achieved for a facility or activity, and whether the basic safety objectives and safety criteria established by the designer, the operating organization and the regulatory body in compliance with the requirements for protection and safety - as established in the International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources - have been fulfilled (GSR part 4 Requirement 4).

The performance of a facility or activity in all operational states and, as necessary, in the post-operational phase shall be assessed in the safety analysis (GSR part 4 Requirement 14).

Data on operational safety performance shall be collected and assessed (GSR part 4 Requirement 19).

The safety assessment shall be periodically reviewed and updated (GSR part 4 Requirement 24).

Evaluations

Agreed Working Note Outlines (available at http://www-ns.iaea.org/tech-areas/operational-safety, in domain of OSART missions).

4.11. HUMAN-TECHNOLOGY-ORGANIZATION INTERACTION

Human, technological and organizational (HTO) factors are often considered as discrete variables because they are frequently viewed as separate and identifiable issues in the cause of an event. While these factors may very well play a separate and significant role in an operational failure, it is often a combination of several human, organizational and technological factors that lead to events and accidents. Ultimately, safety at a nuclear power plant results from the dynamic interaction of humans, technology and organizations.

The complexity of nuclear power plant operations has been increasing because of higher standards of safety, downward pressure on resources, increased regulatory requirements, and the accumulation of operating experience. Consequently, to ensure that safety is maintained in this complex environment, an approach to safety is needed which takes into account the combination and interaction of all factors impacting plant operations.

The HTO review area has the objective of identifying cross cutting findings that result from the dynamic interactions of human, technical and organizational factors within and also outside the organization. With this, the area also takes into account apparent organizational cultural and leadership issues impacting safety performance.

The strength of this review is the identification of common themes through the integration of information collected from all the other review areas of the OSART as well as additional information collected by the HTO reviewer. The additional information is collected to better understand how the values, attitudes, and beliefs of plant personnel impact their interaction with the technology and organization. The HTO reviewer collaborates with all other reviewers, and in particular with the reviewer of Leadership and Management for Safety as the two review areas have overlapping sections pertaining to the integrated management system; nuclear power plants need to implement an integrated management system that includes human and organizational factors, concepts, and ideas. Integral to this approach is an understanding of the culture of the organization in which the individuals, technology, and organization interact.

The limitation of this review is in the depth and breadth of information collected which inhibits the identification of cultural drivers. The review focuses on the artefacts (observables including behaviour) and the values (claimed and tacit) that can be identified during the OSART mission.

For a full assessment of the safety culture, a methodology applying a broader use of data collection methods and cultural analysis is needed. This is provided in the IAEA Independent Safety Culture Assessment (ISCA[3]) which is offered as an add-on module in the frame of an OSART mission.

[3] An ISCA provides deeper insight into the drivers that shape organizational patterns of behaviours, safety consciousness, and safety performance. By combining a safety culture assessment with an OSART mission, facilities gain a snapshot-in-time of their operating safety performance and the cultural dimensions that influence these results. By exploring the connection between OSART findings and safety culture findings, facilities can begin to identify and systematically address systemic challenges to safety performance.

References

[SF-1 (3.14); GSR Part 2; GS-R-3; GS-G-3.1; GS-G-3.5 (2.32, 2.33, 2.34, Appendix I)]

Expectations

The prime responsibility for safety must rest with the person or organization responsible for facilities and activities that give rise to radiation risks (SF-1 Principle 1).

Effective leadership and management for safety must be established and sustained in organizations concerned with, and facilities and activities that give rise to, radiation risks (SF-1 Principle 3).

Senior management shall ensure that the fundamental safety objective of protecting people and the environment from the harmful effects of ionizing radiation is achieved without unduly limiting the operation of facilities or the conduct of activities that give rise to radiation risks (GSR Part 2 Requirement 1).

The senior management of the organization shall demonstrate leadership for safety. Senior management shall advocate an approach to safety that encompasses all interactions between humans, technology and the organization (GSR part 2 Requirement 2).

Managers at all levels in the organization shall demonstrate leadership for safety in the application of the management system and in the fostering of a strong safety culture. Managers at all levels in the organization shall demonstrate leadership for safety, including the establishment and continuous improvement of the management system (GSR Part 2 Requirement 3).

Senior management shall establish, apply, maintain and continuously improve a management system for ensuring safety (GSR Part 2 Requirement 4).

Senior management shall establish goals, strategies, plans, policies and objectives for the organization that are consistent with the safety policy (GSR Part 2 Requirement 5).

Interactions with interested parties shall be integrated into the management system (GSR Part 2 Requirement 6).

The management system shall integrate all elements of management, including safety, health, the environment, security, quality, as well as societal and economic elements, so that safety is not compromised (GSR Part 2 Requirement 7).

The requirements for the management system shall be applied using a graded approach based on the safety significance of each activity and process (GSR Part 2 Requirement 8).

Processes and activities shall be developed and managed to achieve the organization's goals safely (GSR Part 2 Requirement 10).

Senior management shall determine and shall ensure the availability of the competences and resources necessary to carry out the activities of the organization to ensure safety (GSR Part 2 Requirement 11).

The effectiveness of the management system shall be measured, assessed and improved so as to enhance safety related performance (GSR Part 2 Requirement 13).

Senior management shall regularly commission independent assessments and self-assessments of safety culture and leadership for safety (GSR Part 2 Requirement 15).

The operating organization shall be staffed with competent managers and sufficient qualified personnel for the safe operation of the plant (SSR-2/2 Requirement 4).

All safety barriers are designed, constructed, strengthened, breached or eroded by the action or inaction of individuals. Human factors in the organization are critical for safe operation and should not be separated from technical aspects. Ultimately, safety results from the interaction of individuals with technology and with the organization. (GS-G-3.5, 2.32).

The concept of safety culture embraces this integration of individuals and technical aspects (GS-G-3.5, 2.33).

In a strong safety culture, there should be a knowledge and understanding of human behaviour mechanisms, and established human factor principles should be applied to ensure the outcomes for safety of individuals–technology–organization interactions. This could be achieved by including experts on human factors in all relevant activities and teams (GS-G-3.5, 2.34).

Evaluations

Agreed Working Note Outlines (available at http://www-ns.iaea.org/tech-areas/operational-safety, in domain of OSART missions).

4.12. LONG TERM OPERATION

The long term operation (LTO) review assesses strategy and key elements for LTO of NPPs, including implementing appropriate activities to ensure that plant safety will be maintained during the LTO period.

Ageing management of NPPs is an important activity that must be considered in conjunction with the decision to pursue LTO. Effective ageing management programmes are key elements in the safe and reliable operation of NPPs, both during the timeframe originally planned for operation and for the period of LTO. Although the LTO module of an OSART can be carried out at any time during the lifetime of the NPP, it is nonetheless an important part of the OSART review for plants planning to extend their operational life. When LTO is not part of the OSART mission, aging management is covered by the TS section. For a deeper review of the LTO area, the IAEA provides a SALTO (Safety Aspects of LTO) peer review service, which is a comprehensive safety review focused on activities for safe LTO of NPPs. SALTO Peer Review Guidelines are used as guidance for the SALTO peer review service.

References

[SSR-2/2; NS-G-2.6; NS-G-2.12; GS-G-3.1; GS-G-3.10; SSG-13; SSG-25; Safety Reports Series No.57]

Expectations

The operating organization shall have the prime responsibility for safety in the operation of a nuclear power plant (SSR-2/2 Requirement 1).

The operating organization shall be staffed with competent managers and sufficient qualified personnel for the safe operation of the plant. (SSR-2/2 Requirement 4).

The operating organization shall establish a system for continuous monitoring and periodic review of the safety of the plant and of the performance of the operating organization. (SSR-2/2 Requirement 9).

The operating organization shall ensure that a systematic assessment is carried out to provide reliable confirmation that safety related items are capable of the required performance for all operational states and for accident conditions. (SSR-2/2 Requirement 13).

The operating organization shall ensure that an effective ageing management programme is implemented to ensure that required safety functions of systems, structures and components are fulfilled over the entire operating lifetime of the plant. (SSR-2/2 Requirement 14).

Where applicable, the operating organization shall establish and implement a comprehensive programme for ensuring the long-term safe operation of the plant beyond the timeframe established in the licence conditions, design limits, safety standards and/or regulations. (SSR-2/2 Requirement 16).

Evaluations

Agreed Working Note Outlines (available at http://www-ns.iaea.org/tech-areas/operational-safety, in domain of OSART missions).

4.13. COMMISSIONING

Commissioning is the process during which, once they have been constructed, plant structures, systems and components are tested and placed in operation, with the objective of verifying that their design assumptions are valid. This process continues until the plant is at full power and all required testing at this power level has been conducted. In order to meet the expected performance criteria, the plant is verified as-built and pre-operational plant adjustments are made. Commissioning also includes testing prior and subsequent to fuel loading. It is therefore essential for safety that the commissioning programme and individual system testing be designed in such a way that those design assumptions can be verified and quality can be assured throughout the commissioning process.

The commissioning process provides the best scenario for preparing personnel and procedures for the normal operation of the plant. Operating personnel in all disciplines are involved as much as possible in commissioning activities, and the operating procedures are validated to the extent practicable, with the participation of future operating staff.

During commissioning, an extensive amount of data is collected on structures, systems and components. This baseline data will be the reference for subsequent operational testing in order to prevent plant degradation.

The commissioning programme and its results are an important part of the licensing process of the plant. Clear and well defined responsibilities and requirements for the operational, commissioning and regulatory organizations are essential to satisfy the licensing requirements for the plant in a timely manner.

The commissioning results greatly depend on the interfaces among the construction functions, operations and designers. The boundaries of responsibility vary from site to site. The levels of cooperation between these groups will influence the quality of commissioning.

Responsibility for the plant is eventually transferred to the operating organization. This could be done gradually or in specified stages. A high quality and comprehensive handover is necessary to ensure that the plant meets its design intent and adequate knowledge management is established.

References

[SSR-2/2; GSR part 4; NS-G-2.3; SSG-3; SSG-28; Safety Reports Series No.65].

Expectations

The operating organization shall have the prime responsibility for safety in the operation of a nuclear power plant (SSR-2/2 Requirement 1).

The structure of the operating organization, and functions, roles and responsibilities of its personnel, shall be established and documented (SSR-2/2 Requirement 3).

The operating organization shall be staffed with competent managers and sufficient qualified personnel for the safe operation of the plant (SSR-2/2 Requirement 4).

The operating organization shall ensure that the plant is operated in accordance with the set of operational limits and conditions (SSR-2/2 Requirement 6).

The operating organization shall ensure that all activities that may affect safety are performed by suitably qualified and competent persons (SSR-2/2 Requirement 7).

The operating organization shall establish and maintain a system for the control of records and reports (SSR-2/2 Requirement 15).

The operating organization shall establish an operating experience programme to learn from events at the plant, and events in the nuclear industry and other industries worldwide (SSR-2/2 Requirement 24).

The operating organization shall ensure that a commissioning programme for the plant is established and implemented (SSR-2/2 Requirement 25).

The safety assessment shall cover all the stages in the lifetime of a facility or activity in which there are possible radiation risks (GSR part 4 Requirement 12).

Evaluations

Agreed Working Note Outlines (available at http://www-ns.iaea.org/tech-areas/operational-safety, in domain of OSART missions).

4.14. TRANSITIONAL PERIOD FROM OPERATION TO DECOMMISSIONING

It is considered that by requesting this module to be included in an OSART mission, the plant acknowledges that no specific IAEA safety guides have as yet been developed.

The transitional period is a specific stage in the life cycle of any nuclear facility when the facility is still in the operational phase, but is actually preparing for the decommissioning process. Effective planning of the transitional period is very important for safe and timely decommissioning.

The length of the transitional period will be variable depending upon the circumstances surrounding each individual nuclear power plant – the key point is that standards of safety should be maintained during the transitional period. As the full range of operational activities should be included in an OSART mission, it is important to also cover this period.

The transitional period starts when the public announcement of the final shutdown date is made, and continues until all fuel has been permanently removed from the reactor core and spent fuel storage.

A large number of changes to the management system, staff responsibilities and plant configuration can be made during the transitional period. A significant number of employees (including contractors), possibly with minimal nuclear experience, may be involved in transitional activities. The human resources management policy should focus on:

— Motivation of site personnel for the new tasks and objectives;
— Retention of the necessary pool of experienced site personnel for the planned activities;
— Amendment of the human resources management policy to mitigate the possible negative consequences of downsizing.

References

[SSR-2/2; GSR part 6; NS-G-2.1; NS-G-2.2; NS-G-2.3; NS-G-2.6; NS-G-2.14; GS-G-3.5; GS-G-4.1; SSG-13; SSG-25; WS-G-2.1; Safety Reports Series No.36]

Expectations

The operating organization shall have the prime responsibility for safety in the operation of a nuclear power plant (SSR-2/2 Requirement 1).

The structure of the operating organization, and functions, roles and responsibilities of its personnel, shall be established and documented (SSR-2/2 Requirement 3).

The operating organization shall be staffed with competent managers and sufficient qualified personnel for the safe operation of the plant (SSR-2/2 Requirement 4).

The operating organization shall ensure that the plant is operated in accordance with the set of operational limits and conditions (SSR-2/2 Requirement 6).

The operating organization shall ensure that all activities that may affect safety are performed by suitably qualified and competent persons (SSR-2/2 Requirement 7).

The operating organization shall establish and implement a system for plant configuration management to ensure consistency between design requirements, physical configuration and plant documentation (SSR-2/2 Requirement 10).

The operating organization shall establish and implement a programme to manage modifications (SSR-2/2 Requirement 11).

The operating organization shall establish and maintain a system for the control of records and reports (SSR-2/2 Requirement 15).

The operating organization shall ensure that effective programmes for maintenance, testing, surveillance and inspection are established and implemented (SSR-2/2 Requirement 31).

The operating organization shall prepare a decommissioning plan and shall maintain it throughout the lifetime of the plant, unless otherwise approved by the regulatory body, to demonstrate that decommissioning can be accomplished safely and in such a way as to meet the specified end state (SSR-2/2 Requirement 33).

Exposure during decommissioning shall be considered to be a planned exposure situation, and the relevant requirements of the Basic Safety Standards shall be applied accordingly during decommissioning (GSR part 6 Requirement 1).

Safety shall be assessed for all facilities for which decommissioning is planned and for all facilities undergoing decommissioning (GSR part 6 Requirement 3).

The licensee shall plan for decommissioning and shall conduct the decommissioning actions in compliance with both the authorization for decommissioning and requirements derived from the national legal and regulatory framework. The licensee shall be responsible for all aspects of safety, radiation protection and protection of the environment during decommissioning (GSR part 6 Requirement 6).

The licensee shall ensure that its integrated management system covers all aspects of decommissioning (GSR part 6 Requirement 7).

The licensee shall select a decommissioning strategy that will form the basis for planning the decommissioning. The strategy shall be consistent with the national policy on the management of radioactive waste (GSR part 6 Requirement 8).

Responsibilities in respect of financial provisions for decommissioning shall be set out in national legislation. These provisions shall include establishing a mechanism to provide adequate financial resources for ensuring safe decommissioning and to ensure that they are available when necessary (GSR part 6 Requirement 9).

Prior to execution of decommissioning actions, a final decommissioning plan shall be prepared and shall be submitted to the regulatory body for approval (GSR part 6 Requirement 11).

The licensee shall implement the final decommissioning plan, including management of radioactive waste, in compliance with national regulations (GSR part 6 Requirement 12).

Emergency response arrangements for decommissioning, commensurate with the hazards, shall be established and maintained, and events significant to safety shall be reported to the regulatory body in a timely manner (GSR part 6 Requirement 13).

Radioactive waste shall be managed for all waste streams in decommissioning (GSR part 6 Requirement 14).

Evaluations

Agreed Working Note Outlines (available at http://www-ns.iaea.org/tech-areas/operational-safety, in domain of OSART missions).

4.15. USE OF PSA FOR PLANT OPERATIONAL SAFETY IMPROVEMENTS

Probabilistic safety assessment (PSA) has been shown to provide important safety insights, in addition to those provided by deterministic analysis, and is widely recognized as a comprehensive, structured approach to identifying accident scenarios and deriving numerical estimates of risks related to NPP operation and associated plant vulnerabilities. Based on its results, the design basis for SSCs rated as important to safety can be established and confirmed. This serves to ensure full confidence in the fact that the design will comply with the general safety objectives. As part of an OSART review, mainly the following PSA applications are of interest:

— PSA applications in connection with design evaluation and plant modifications;

— PSA applications in connection with plant operation;

— PSA applications in connection with risk-informed Operational Limits and Conditions.

Where the results of the PSA are to be used in support of the decision-making process, a formal organizational framework and technical support for doing so should be established. The details of the decision-making process will depend on the purpose of the particular PSA application, the nature of the decision to be made and the PSA results to be used.

References

[SSR-2/2; GSR part 4; SSR-2/1; NS-G-2.3; NS-G-2.4; NS-G-2.12; NS-G-4.3; SSG-3; SSG-4; SSG-25]

Expectations

The operating organization shall have prime responsibility for safety in the operation of a nuclear power plant (SSR-2/2 Requirement 1).

The operating organization shall ensure that safety related activities are adequately analysed and controlled to ensure that the risks associated with the harmful effects of ionizing radiation are kept as low as reasonably achievable (SSR-2/2 Requirement 8).

The operating organization shall establish a system for continuous monitoring and periodic review of the safety of the plant and of the performance of the operating organization (SSR 2/2 Requirement 9).

Systematic safety assessment of the plant, in accordance with the regulatory requirements, shall be performed by the operating organization throughout the plant's operating lifetime, with due account taken of operating experience and significant new safety related information from all relevant sources (SSR-2/2 Requirement 12).

The operating organization shall ensure that effective programmes for maintenance, testing, surveillance and inspection are established and implemented (SSR-2/2 Requirement 31).

The operating organization shall establish and implement arrangements to ensure the effective performance, planning and control of work activities during outages (SSR-2/2 Requirement 32)

A safety assessment shall be carried out for all applications of technology that give rise to radiation risks; that is, for all types of facilities and activities (GSR part 4 Requirement 2).

The responsibility for carrying out the safety assessment shall rest with the responsible legal person; that is, the person or organization responsible for the facility or activity (GSR part 4 Requirement 3).

The safety assessment has to include a safety analysis, which consists of a set of different quantitative analyses for evaluating and assessing challenges to safety in various operational states, anticipated operational occurrences and accident conditions, by means of deterministic and also probabilistic methods (GSR part 4, 4.13).

The possible radiation risks associated with the facility or activity shall be identified and assessed. (GSR part 4 Requirement 6)

All safety functions associated with a facility or activity shall be specified and assessed (GSR part 4 Requirement 7).

It shall be determined in the safety assessment whether a facility or activity uses, to the extent practicable, structures, systems and components of robust and proven design (GSR part 4 Requirement 10).

Human interactions with the facility or activity shall be addressed in the safety assessment, and it shall be determined whether the procedures and safety measures that are provided for all normal operational activities, in particular those that are necessary for implementation of the operational limits and conditions, and those that are required in response to anticipated operational occurrences and accidents, ensure an adequate level of safety (GSR part 4 Requirement 11).

The performance of a facility or activity in all operational states and as necessary in the post-operational phase shall be assessed in the safety analysis. (GSR part 4 Requirement 14)

Both deterministic and probabilistic approaches shall be included in the safety analysis (GSR part 4 Requirement 15).

Any calculational methods and computer codes used in the safety analysis shall undergo verification and validation (GSR part 4 Requirement 18).

Data on operational safety performance shall be collected and assessed (GSR part 4 Requirement 19).

The results and findings of the safety assessment shall be documented (GSR part 4 Requirement 20).

The operating organization shall carry out an independent verification of the safety assessment before it is used by the operating organization or submitted to the regulatory body (GSR part 4 Requirement 21).

The safety assessment shall be periodically reviewed and updated (GSR part 4 Requirement 24).

Evaluations

Agreed Working Note Outlines (available at http://www-ns.iaea.org/tech-areas/operational-safety, in domain of OSART missions).

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Annex I

STANDARD STRUCTURE AND CONTENT OF AN ADVANCE INFORMATION PACKAGE FOR AN IAEA OSART MISSION

The Advance Information Package (AIP) is prepared by the nuclear power plant (NPP) hosting the OSART mission and is used to convey information relevant to the OSART team members for the preparation of their review.

The package should contain adequate information and data to understand the overall organizational structures and current operating practices. It should also include an overview of the NPP's approach to operational safety, the key operational features and the organizational setup. While the contents of the package should cover essential plant features, it should also be compact. Many plants subsequently use the AIP for induction training of new employees.

The workload in preparing the package should be minimized. The compilation of information should be based on and/or utilize existing documents such as routinely prepared reports, procedures and training materials. Focus on the content is encouraged, with limited effort spent on editing. The package should be in English as this is the OSART working language.

To the extent possible, the format of the AIP should follow the review areas as that of the OSART Guidelines.

I-1. ADMINISTRATIVE INFORMATION

(1) Arrival logistics (airport, hotel, plant);
(2) Transportation airport-hotel, hotel-plant;
(3) Hotel accommodation information (name, telephone number, website address, internet access);
(4) Contact points at the plant and list of counterparts; (names, e-mail addresses, telephone numbers);
(5) Site accommodation (site access controls, controlled area access, meeting rooms, OSART offices, clerical/interpreting support, office equipment and lunch arrangements);
(6) Summary of site-specific radiological, industrial and fire safety rules, and emergency response provisions.

I-2. GENERAL INFORMATION

I-2.1. Plant description

— Overall site and plant description, and which units are to be reviewed
— Brief plant operating history
— Current utility/plant organizational charts
— Locations of major plant structures and buildings (schematic map of their layout)
— Performance indicators.

I-2.2. Design information

— Major process and safety systems;
— Key design parameters;
— Unique safety features.

I-2.3. External organizations

Brief description of the main functions, structures and interactions of external organizations liaising with the nuclear power plant:

— Utility headquarters;
— Industry organizations;
— Regulatory authorities;
— Main suppliers and sub-contractors;
— Contractors supporting plant maintenance.

I-2.4. Self-assessment

— For each review area, a description of how each individual area expectation is met;
— Specific gaps where performance or programmes do not fully meet IAEA Safety standards;
— For each gap identified, an explanation of what corrective actions are being taken/planned to close the gap, including budget commitments, staffing, document preparation, increased or modified training, equipment purchases, etc.

I-3. TECHNICAL INFORMATION

- Outline of operating license;
- Safety performance indicators;
- Proposal of detailed review schedule for each area;
- List of abbreviations and acronyms used in the plant;
- Colour-coded plant system identification and labelling arrangements;
- List of designations of organizational units (department, division, section, group;, etc.) and positions (superintendent, manager, chief, head, etc.);
- List, terms of reference and timetables of the most significant regular meetings at the plant.

I-4. REVIEW AREAS INFORMATION

I-4.1. Leadership and Management for Safety

- Organization and structure;
- Overall management programme, including a management philosophy, management;
- objectives and expectations, goals and nuclear safety policies;
- Statistics on staff turnover and current age profile;
- Recent plant status report (monthly, quarterly or yearly);
- Brief description of nuclear safety management practices;
- An operating philosophy for procedures and instructions;
- Reviewing bodies (safety committees – internal and external);
- Brief description of document control system;
- Safety culture and human performance aspects;
- Overall approach to industrial safety.

I-4.2. Training and Qualification

- Organization of training functions;
- Overall plant training programme, including initial and continuing training;
- List of major training procedures;
- Overview of training facilities;
- Qualification requirements for key plant positions;
- General employee training;
- Training activities planned during the OSART mission.

I-4.3. Operations

- Operating organization, shift structure and staffing levels;
- Overall distribution of responsibility during normal operation and accident conditions, lines of command and communication;
- Work request authorization, equipment isolation and tagging system, locking systems;
- Control of modifications;
- List of normal operating procedures;

— Brief description of operating limits and conditions;
— System of emergency operating procedures;
— Accident management approach;
— Overall approach to fire protection and prevention.

I-4.4. Maintenance

— Maintenance organization;
— Overall programme for corrective and preventive maintenance;
— Evaluation, analysis and trending of maintenance activities;
— Typical outage programme/schedule;
— Overview of maintenance facilities/workshops;
— Brief description of in-service inspection programme;
— List of major maintenance procedures;
— Material condition strategy;
— Work authorization programme;
— Spare parts and material storage programme and facilities.

I-4.5. Technical Support

— Technical support organization and structure, including interface with and support of external organizations such as headquarters, international and national organizations, manufacturers and other institutions;
— Outline of surveillance test programme;
— Plant modification philosophy, with a list of past and planned major modifications;
— Temporary modification review process and current status;
— Probabilistic safety analysis undertaken;
— Periodic safety report findings and current status of the safety analysis report;
— Overview of reactor physics;
— New and spent fuel management;
— Overview of computer-based systems important to safety.

I-4.6. Operating Experience

— Operating experience organization and management;
— Reporting and review process of internal and external experience;
— Reportable events, including brief description of root cause analysis undertaken over the last three years;
— Sources of operating experience;
— Corrective action programme;
— Analysis and trending of events, including low-level events and near-misses;
— Human performance investigations;
— Use made of operating experience;
— Plant assessment and indicators of operating experience;
— Sharing the plant's operating experience with the rest of the nuclear industry.

I-4.7. Radiation Protection

- Radiation protection organization and staffing level;
- Outline of applicable radiation protection regulations;
- Radiation exposure and contamination control policy;
- RP instrumentation;
- Radioactive waste management;
- List of radiation protection procedures;
- Recent radiation protection report data regarding collective and individual dose statistics, contamination events;
- ALARA;
- Measures applied in emergency situations.

I-4.8. Chemistry

- Chemistry organization and staffing level;
- List of chemistry procedures;
- Quality control of operational chemicals;
- Overview of chemistry specifications, system of parameter limits, operational history;
- Overview of online monitors and sampling stations;
- Laboratory facilities, equipment and instruments;
- Inter-laboratory comparisons;
- Chemistry surveillance programme;
- Post-accident sampling system (PASS) operation.

I-4.9. Emergency Planning and Preparedness

- National and plant organization;
- EPP documentation hierarchy diagram;
- Emergency response philosophy, emergency classification;
- Outline of plant emergency plan and interfaces with external organizations;
- Plant emergency facilities on-site and off-site;
- Emergency notification and communication;
- Emergency response;
- Intervention levels;
- Emergency training, drills and exercises – feedback.

I-4.10. Accident Management

- Overview of accident management;
- Analytical support for severe accident management;
  - Scope of the supporting analyses;
  - Use of analysis results;
- Development of procedures and guidelines;
  - SAM strategies
  - Guidelines
  - Hardware provisions and I&C

- Plant emergency arrangements with respect to SAM;
  - Lines of responsibility
  - Emergency centres
  - Communications
- Verification and validation of procedures and guidelines;
- Training needs and training performance;
- Severe accident management updating and revisions.

I-4.11. Human, Technology, Organization Interaction

- HTO and safety culture;
- Leadership for safety;
- Management for safety;
- Management of human factors ;
- Safety related activities;
- Monitoring and assessment of safety performance;
- Learning organization;
- Knowledge management programmes.

I-4.12. Long-Term Operation

- Plant policy for LTO, organization and staffing level;
- LTO related requirements, codes and standards;
- LTO implementation programme;
- Aging management.

I-4.13. Commissioning

- Commissioning process;
- Organization and management of commissioning;
- Implementation of commissioning programme;
- Control of plant configuration;
- Use of PSA and OEF.

I-4.14. Transition from Operation to Decommissioning

- Plant policy for transition from operation to decommissioning, organization and staffing level;
- Management policies and activities;
- Conduct of operations;
- Work management and housekeeping;
- Technical support activities for the transition period;
- Use of operating experience;
- Radiation protection and waste management for transition period;
- Core management and fuel handling;
- Chemistry;
- Emergency planning and preparedness.

I-4.15. Use of PSA for plant operational safety improvements

- Organization and management;
  - Functions and responsibilities
  - Management and organization of PSA development process
  - Interactions with regulatory body
- Development and use of PSA;
  - Objectives and scope
  - Documentation
  - Validation and review of the PSA. Independent verification
  - PSA updating programme
- Use of PSA in PSA applications;
  - PSA application programme
  - PSA applications in connection with design and plant modifications
  - PSA applications in connection with plant operation and accident mitigation
  - PSA applications in connection with risk-informed technical specifications (if available).

Annex II

OSART TEAM CODE OF CONDUCT

A. Review gaps to IAEA Safety Standard

Thresholds for identifying recommendations and suggestions are based on the most important nuclear safety and personnel safety gaps in the plant being reviewed. These gaps may concern current plant performance and important historical performance.

B. Focus on the key stakeholders of the OSART mission

Team members have to bear in mind that OSART results will be used by a wide range of stakeholders. The key stakeholders include the Member State, plant staff, the global nuclear industry, and the IAEA. Improving plant safety performance is the highest priority when issuing recommendations and suggestions.

C. OSART teams are well prepared before arriving on site

Advance Information Package material is well reviewed and analysed to the maximum extent possible before the on-site portion of the mission.

D. OSART teams are out in the plant, amongst both people and equipment, observing important plant activities

Team members must be proactive and inquisitive, and be present during in-plant activities that are important to nuclear and personnel safety. This may include backshift and weekend observations.

E. Key events and plant performance are thoroughly understood

Team members need to fully understand the plant's most consequential events and performance gaps. Team members conduct an independent review of information provided by plant staff.

F. The OSART recommendations and suggestions are based on facts

The team and plant staff work together to validate facts. It is the team's responsibility to draw objective conclusions from the facts, and determine recommendations and suggestions.

G. OSART teams build strong professional relationships with plant counterparts

Reviewers and Team Leaders strive to be experts in communication and to be models of integrity and professionalism. Reviewers should listen closely to their counterparts and strive to understand their perspectives of plant performance.

H. Strength is with the team, not one individual

Team members strive to fulfil their roles on an OSART mission team and professionally challenge each other's opinions.

I. The OSART team reinforces the integrity of the review process

Team members uphold the principles of the OSART mission methodology. This includes insisting that plant staff be open during their interactions with the OSART team and that a normal schedule of work activities be maintained during on-site periods. Team members do not back down on issues if faced with counterpart defensiveness. The team members support each other recognizing that the OSART report is a result of a team work.

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No. 23

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