



XA0200805

IAEA Services Series No. 7

IAEA-SVS-07

Operational safety review programmes for nuclear power plants

Guidelines for assessment



INTERNATIONAL ATOMIC ENERGY AGENCY

. . 33 / 09

January 2002

IAEA SAFETY RELATED PUBLICATIONS

IAEA SAFETY STANDARDS

Under the terms of Article III of its Statute, the IAEA is authorized to establish standards of safety for protection against ionizing radiation and to provide for the application of these standards to peaceful nuclear activities.

The regulatory related publications by means of which the IAEA establishes safety standards and measures are issued in the **IAEA Safety Standards Series**. This series covers nuclear safety, radiation safety, transport safety and waste safety, and also general safety (that is, of relevance in two or more of the four areas), and the categories within it are **Safety Fundamentals**, **Safety Requirements** and **Safety Guides**.

- **Safety Fundamentals** (blue lettering) present basic objectives, concepts and principles of safety and protection in the development and application of nuclear energy for peaceful purposes.
- **Safety Requirements** (red lettering) establish the requirements that must be met to ensure safety. These requirements, which are expressed as ‘shall’ statements, are governed by the objectives and principles presented in the Safety Fundamentals.
- **Safety Guides** (green lettering) recommend actions, conditions or procedures for meeting safety requirements. Recommendations in Safety Guides are expressed as ‘should’ statements, with the implication that it is necessary to take the measures recommended or equivalent alternative measures to comply with the requirements.

The IAEA’s safety standards are not legally binding on Member States but may be adopted by them, at their own discretion, for use in national regulations in respect of their own activities. The standards are binding on the IAEA in relation to its own operations and on States in relation to operations assisted by the IAEA.

OTHER SAFETY RELATED PUBLICATIONS

Under the terms of Articles III and VIII.C of its Statute, the IAEA makes available and fosters the exchange of information relating to peaceful nuclear activities and serves as an intermediary among its Member States for this purpose.

Reports on safety and protection in nuclear activities are issued in other series, in particular the **IAEA Safety Reports Series**, as informational publications. Safety Reports may describe good practices and give practical examples and detailed methods that can be used to meet safety requirements. They do not establish requirements or make recommendations.

Other IAEA series that include safety related sales publications are the **Technical Reports Series**, the **Radiological Assessment Reports Series** and the **INSAG Series**. The IAEA also issues reports on radiological accidents and other special sales publications. Unpriced safety related publications are issued in the **TECDOC Series**, the **Provisional Safety Standards Series**, the **Training Course Series**, the **IAEA Services Series** and the **Computer Manual Series**, and as **Practical Radiation Safety Manuals** and **Practical Radiation Technical Manuals**.

IAEA Services Series No. 7

Operational safety review programmes for nuclear power plants

Guidelines for assessment



INTERNATIONAL ATOMIC ENERGY AGENCY

January 2002

The originating Section of this publication in the IAEA was:

Operational Safety Section
International Atomic Energy Agency
Wagramer Strasse 5
P.O. Box 100
A-1400 Vienna, Austria

OPERATIONAL SAFETY REVIEW PROGRAMMES FOR NUCLEAR POWER PLANTS:
GUIDELINES FOR ASSESSMENT

IAEA, VIENNA, 2002

IAEA-SVS-07

© IAEA, 2002

Printed by the IAEA in Austria
January 2002

FOREWORD

The IAEA has been offering the Operational Safety Review Team (OSART) programme to provide advice and assistance to Member States in enhancing the operational safety of nuclear power plants (NPPs). Simultaneously, the IAEA has encouraged self-assessment and review by Member States of their own nuclear power plants to continuously improve nuclear safety.

Currently, some utilities have been implementing safety review programmes to independently review their own plants. Corporate or national operational safety review programmes may be compliance or performance based. Successful utilities have found that both techniques are necessary to provide assurance that (i) as a minimum the NPP meets specific corporate and legal requirements and (ii) management at the NPP is encouraged to pursue continuous improvement principles. These programmes can bring nuclear safety benefits to the plants and utilities.

The IAEA has conducted two pilot missions to assess the effectiveness of the operational review programme. Based on these missions and on the experience gained during OSART missions, this document has been developed to provide guidance on and broaden national/corporate safety review programmes in Member States, and to assist in maximizing their benefits.

These guidelines are intended primarily for the IAEA team to conduct assessment of a national/corporate safety review programme. However, this report may also be used by a country or utility to establish its own national/corporate safety review programme. The guidelines may likewise be used for self-assessment or for establishing a baseline when benchmarking other safety review programmes.

This report consists of four parts. Section 2 addresses the planning and preparation of an IAEA assessment mission and Sections 3 and 4 deal with specific guidelines for conducting the assessment mission itself.

The work performed by all the participating experts, and the comments and ideas contributed by experts on operational safety are greatly appreciated. The IAEA officers responsible for this report were M. Domenech and B. Hansson of the Division of Nuclear Installation Safety.

EDITORIAL NOTE

The use of particular designations of countries or territories does not imply any judgement by the publisher, the IAEA, as to the legal status of such countries or territories, of their authorities and institutions or of the delimitation of their boundaries.

The mention of names of specific companies or products (whether or not indicated as registered) does not imply any intention to infringe proprietary rights, nor should it be construed as an endorsement or recommendation on the part of the IAEA.

CONTENTS

1. INTRODUCTION	1
2. GUIDELINES FOR PLANNING AND PREPARATION OF ASSESSMENT	1
2.1. Objectives of a mission to assess national/corporate operational safety review programmes and results	1
2.2. Methodology for missions to assess national/corporate operational safety review programmes and results	2
2.2.1. Phases of assessment	2
2.2.2. Assessment process.....	2
2.2.3. Reporting	2
2.2.4. Assessment of nuclear safety	3
2.3. Documents to be reviewed.....	3
2.4. Schedule.....	3
2.5. Composition of the assessment team	3
2.6. Preparation	4
3. PRACTICAL HINTS FOR CONDUCTING ASSESSMENT MISSIONS	4
3.1. Preparation	4
3.2. Conduct of document assessment	4
3.3. Conduct of observations	5
3.4. Conduct of interviews	5
4. SPECIFIC GUIDELINES FOR CONDUCTING ASSESSMENT MISSIONS.....	6
4.1. Purpose, principles and methodology.....	7
4.1.1. Purpose and objectives	7
4.1.2. Principles and standards	7
4.1.3. Methodology.....	8
4.1.4. Follow-up	9
4.1.5. Corporate support	10
4.2. Organization and administration of the programme.....	10
4.2.1. Organization	10
4.2.2. Planning.....	10
4.3. Personnel	11
4.3.1. Team composition	11
4.3.2. Qualification	11
4.4. Reporting	12
4.5. Effectiveness of the process and feedback	13
4.5.1. Effectiveness.....	13
4.5.2. Feedback/improvement process	13
4.6. Documentation	14
4.7. Team training.....	14
4.8. Preparatory activities of the safety review team.....	15
4.9. Safety review process	15
4.10. Safety review report.....	17
4.10.1. General	17
4.10.2. Results	17
4.10.3. Comments on the report	18

4.10.4. Follow-up reports (if applicable).....	18
4.11. Main conclusions.....	19
GLOSSARY	21
BIBLIOGRAPHY	21
CONTRIBUTORS TO DRAFTING AND REVIEW	22

1. INTRODUCTION

These guidelines are prepared to provide a basic structure and methodology for conducting a mission to assess national/corporate operational safety review programmes and results, and to provide specific guidance to the assessment team members for conducting the assessment. These guidelines will also provide guidance to the host country or utility in making the necessary preparations for the mission.

These guidelines are intended to help assessment team members to conduct the assessment in the light of their own experience. They are not all inclusive and should not limit the team members' assessment.

These guidelines may be used by a country or utility to establish a national/corporate safety review programme. Furthermore, the guidelines can be used for a self-assessment programme or for establishing a baseline when benchmarking with other utilities.

2. GUIDELINES FOR PLANNING AND PREPARATION OF ASSESSMENT

2.1. Objectives of a mission to assess national/corporate operational safety review programmes and results

The objective of this type of mission is to assess the safety review programme applied at a nuclear power plant (NPP), not to assess performance of the nuclear power plant itself.

The assessment team will consist of a group of international experts with proven experience in national and/or international safety review programmes. The assessment will be made based on the combined expertise of the group and will therefore not be a regulatory inspection or audit against set codes and standards. Instead, it will be technical exchange of experience and practices at process level aimed at strengthening safety review programmes, procedures and practices.

Key objectives of the missions are:

- To provide the host country and/or the utility with an objective and independent assessment of the status of the safety review programme with respect to international practices and its effectiveness to evaluate and improve operational safety at nuclear power plants.
- To identify areas where the programme falls short of international best practices and provide the host utility with ways to improve it.
- To provide key staff at the host utility with an opportunity to discuss their review practices with experts who have experience of other practices in the same area.
- To provide information regarding good practices identified in the course of the assessment.
- To provide assessment team members from Member States with opportunities to broaden their experience and knowledge in organizing and conducting safety reviews.

Objectives may vary with the scope and purpose of the assessment mission, e.g.:

- Assessment of the national or utility safety review programme.
- Assessment of a safety review mission.
- Assessment of the safety review results.

The facility where the assessment of safety review is conducted, utility or plant, may also significantly influence the mission objectives.

2.2. Methodology for missions to assess national/corporate operational safety review programmes and results

2.2.1. Phases of assessment

The assessment team will use four steps to acquire the information needed to develop their conclusions. These steps are:

- Assessment of written material; this may be carried out prior to a site visit at the utility headquarters.
- Discussion with personnel at the utility who manage the safety review programme and are involved in the process; this will be carried out in the beginning of the mission at the utility's headquarters and with plant personnel and safety review team members during the mission.
- Direct observation of performance, status and activities; normally this will be carried out at site.
- Discussion of evaluations and tentative conclusions with the utility liaison officer; normally this will be carried out at site.

The aforementioned activities should be scheduled to achieve the assessment objectives and minimize the impact of this assessment on the safety review in progress and on the plant.

Two additional steps will be needed to assess the safety review team training and final results. Assessment of safety review team training is desirable to be carried out where the training is going on and assessment of final results may take place at the IAEA or at the utility headquarters after the final report is issued.

2.2.2. Assessment process

Members of the assessment team are selected to ensure that different approaches are represented. Combining this knowledge with the IAEA experience in this field allows the best international standard to be identified.

In the evening of each working day of the review, the assessment team leader calls a meeting, where every team member presents his findings to the team. This creates an opportunity for other team members to contribute their views, and to reach a consensus on the findings.

2.2.3. Reporting

A draft assessment report will be generated by the assessment team during the visit. This report will contain the findings identified by the team during the visit. These findings will be discussed with the utility counterparts during the visit and before leaving the site. The

assessment of the final safety review report will be incorporated into the assessment report after the visit. The assessment report will suggest ways to correct the identified weaknesses.

The draft assessment report will be sent to the utility for comments within one month of the assessment visit. After the comments are incorporated, the final assessment report will be sent to the utility.

2.2.4. Assessment of nuclear safety

Safety review programmes can bring to the utility safety and reliability benefits. However, in this case the assessment team will be oriented mainly towards nuclear safety. One task for the assessment team members is to establish how the safety review team determines if nuclear safety is considered an utmost priority.

Assessment of the safety review results should demonstrate how nuclear safety is taken into consideration by identifying results directly related to this topic.

2.3. Documents to be reviewed

As the basis for the assessment of the performance of the safety review programme and personnel the utility should make the following documents available to the assessment team. It would be desirable to have some of this information prior to the mission.

- Description of the safety review programme.
- Guidelines for conducting the safety reviews.
- Criteria for recruiting safety review team members.
- Training material for the safety review team.
- Guides for reporting and writing.
- Copies of previous safety review reports with results.
- Follow-up guidelines.

2.4. Schedule

The duration of a standard assessment mission will be of one and a half weeks. Two days will be spent at the corporate organisation and five days at the plant where the safety review takes place. It is likely to be carried out in parallel with the safety review.

A visit of one IAEA staff member for one or two days should be conducted to evaluate the training given to the safety review team and/or the final results of the safety review of the plant. This visit would take place prior to the assessment of the safety review and after the final report is being issued.

The schedule of each assessment mission should be established sufficiently prior to the mission.

2.5. Composition of the assessment team

The assessment team will consist of a team leader from the IAEA and experts from the nuclear industry. The number of experts depends on the scope of the safety review and the assessment, and should not exceed four persons. All team members should have proven experience in national or/and international safety review programmes and a good command of

the English language. If feasible, assessment team members should come from different countries. A representative from the utility could participate in the assessment team activities as an additional member.

2.6. Preparation

The following items should be completed by the IAEA staff to adequately prepare the utility and the assessment team members. A preparatory meeting may be held between the IAEA and the utility if necessary.

For the utility:

- Request the nomination of a liaison officer at the utility
- Send the necessary information to the utility, such as: guidelines for assessment of national/corporate safety review programmes, assessment team composition, etc.
- Request the necessary technical and administrative information.
- Reach an agreement concerning logistics, travel arrangements, schedule and funding.
- Designation of utility/plant counterparts.

For the assessment team members:

- Recruit the assessment team members.
- Request the necessary information from the IAEA and the utility.
- Provide technical and administrative information to the assessment team.
- Inform the assessment team about financial arrangements.

Note: assessment missions to Member States receiving technical assistance are normally covered under Technical Co-operation Projects.

3. PRACTICAL HINTS FOR CONDUCTING ASSESSMENT MISSIONS

3.1. Preparation

Before commencing an assessment of a safety review at a plant, all members of the assessment team should be adequately informed on the responsibilities and scope of the mission. Special emphasis is placed on the fact that the purpose of the mission is to review the safety review programme and not the plant.

3.2. Conduct of document assessment

Documents that prescribe the policies, scope, depth and techniques are assessed to understand expected standards of the safety review programme. Before and/or after conducting observations and interviews, relevant document may be reviewed to determine if the practices are consistent with high industry standards.

In conducting a review, the following points are considered:

- Scope, all relevant areas to nuclear safety are adequately addressed.
- Roles and responsibilities are clear.

- Performance objectives, standards and guidelines are available for all operation areas.

3.3. Conduct of observations

Observations of safety review activities are required to confirm that working practices adhere to effective processes and techniques. Similarly, observations are used to confirm that the safety review team training and team member recruitment have been carried out effectively. However, recognizing the additional burden placed upon the NPP and safety review team, some tips may be helpful to improve effectiveness of observations and smoothen the interfaces between the assessment and the safety review teams.

- Observations will be focused on activities of the safety review team, although it will be necessary to independently form a view of the status of the plant and interfaces between safety review team members and plant counterparts. In addition, specific plant activities may be observed to verify consistency with the safety review results.
- It is inappropriate to treat trends in observations as a reflection of individual performance, either in the safety review team or the plant. Rather, the observations should be treated as symptoms of management or process weaknesses and the persons involved should remain anonymous.
- To avoid disruption to the safety review process, feedback should be avoided during the conduct of observations, unless it is absolutely necessary.
- During observations the assessment team should not interfere with discussions that are taking place.
- Observation of activities should be well planned to minimize disturbances to the normal flow of safety review activities.
- The objective of this mission is to assess safety review programmes and results not the nuclear power plants. Therefore, the information gathered at the plant will be used solely for this purpose.

The activities to be observed should cover the most important aspects of the safety review process. Some of these activities are described as follows:

- Training provided to the safety review team.
- Preparation of the safety review team members.
- Plant tour by safety review team members.
- Daily safety review team meetings and team leader/plant manager meeting.
- Safety review team communications.
- Safety review team member interviews with counterparts.
- Work activities observed by safety review team members.
- General status of the plant and equipment.
- Development of findings.
- Presentation of the results to the plant staff.

3.4. Conduct of interviews

Interviews are essential to understand the programme, practices and issues developed by the safety review team.

An important source of information are the customers of the safety review service provided. The plant and utility managers as direct customers may have an opinion of the effectiveness and value of the safety review programme. Therefore, it would be useful to consult with them and their superiors to determine their degree of satisfaction.

The safety review team leader and some team members may be interviewed as well as some plant counterparts. These interviews should be conducted in such a way that neither the safety review nor the plant activities are impaired. It may be necessary to schedule an additional visit after the safety review has been completed.

The impact of an interpreter during discussions must be considered and measures taken to minimize the possible distractive effect of interpretations, e.g., through the use of microphones and earpieces.

Avoiding possible disruption of the safety review process, opportunities should be found to obtain the opinion of team members and counterparts of the value of the whole process, its credibility and effectiveness in improving operational safety.

The questions should be directed on how effective the programme is in detecting and indicating areas need to be improved.

To conduct effective interviews and to collect useful information, the following tips should be kept in mind:

- Make sure you are interviewing the right people.
- Be prepared. Know what information you seek to obtain from your interviewee.
- Explain the purpose of your questions.
- Put people at ease.
- Avoid confrontation.
- Stay focused.

4. SPECIFIC GUIDELINES FOR CONDUCTING ASSESSMENT MISSIONS

Preparatory work

Prior to the assessment of the safety review programme, the following information should be made available to the assessment team:

- purpose and objectives of the programme
- administrative, safety review and training manual or equivalent
- safety review guidelines
- personnel qualification and training records
- examples of previous safety review reports.

4.1. Purpose, principles and methodology

4.1.1. Purpose and objectives

Expectations

A safety review programme can bring safety and reliability benefits to the utility. To maximize those benefits, the purpose of the programme should be addressed to enhance nuclear safety and be clearly stated.

Investigations

- The purpose and objectives of the safety review programme are clearly stated in a document.
- The purpose of the programme, to enhance nuclear safety, is addressed.
- The described objectives match the national/corporate policy statement.
- The purpose and objectives of the programme are well known and clearly understood in the organization.
- The purpose and objectives are continuously evaluated and updated.

4.1.2. Principles and standards

Expectations

To achieve the objectives of the programme in an effective and precise manner, principles and standards should be clearly stated, disseminated and understood throughout all the appropriate levels in the organization.

Investigations

- Standards or guidelines are clearly established, against which the review findings are determined. They are consistent with good international practices, are specific and comprehensively address all of the areas to be reviewed. If predetermined company specific standards do not exist, reference performance objectives like OSART, WANO, etc. should be used as a basis.
- The plants have had an opportunity to express their agreement to principles and standards to be used during the evaluation.
- Opportunities for improvement address performance and process deficiencies.
- A process exists to ensure that the principles are consistently and equally applied to all plants being reviewed.
- The evaluation process is periodically reviewed and may be subjected to external assessment.
- The organization aggressively pursues the resolution of areas for improvement in accordance with the priorities of the NPP.
- Investigations are critical, seeking root causes, and written in a compelling manner to urge the organization into corrective actions.

4.1.3. Methodology

Expectations

To ensure the effectiveness of the review programme, the methodology used in the programme should contain the required elements, e.g. scope of the review, team composition, communication within the team, etc. If another relevant review process exists within the utility, it should not conflict with the programme assessed.

Investigations

Scope

- A current document exists that describes the methodology to be used. This document is consistent with the objectives document.
- The areas to be reviewed are consistent and complete to cover the purpose of the programme, they are clearly stated and guidelines exist to effectively review them.
- The areas to be reviewed ensure a comprehensive review of the operational status of the plant. These include the most important operational areas, e.g., management, organization and administration, training and qualifications, operations, maintenance, engineering support, radiation protection and essential topics such as: documentation, plant surveillance, operational experience feedback, configuration control, core physics, computer applications, fire protection, chemistry, emergency preparations, equipment and human performance, and management of change.
- The scope is sufficient to cover special operational configurations and working situations, e.g., outages, emergency drills and simulator exercises.
- The corporate organization is subjected to evaluation if necessary.

Preparation

- Adequate arrangement are in place to effectively prepare review teams. Items to be considered are: site events, indicators, corporate requirement, results of pre-reviews, other assessments or audits from the plant, utility or regulator, status of corrective action plans, social problems, etc.
- Self-assessment is encouraged during preparation for the safety review.

Determination of findings

- A consistent and rigorous fact based process is used to determine findings. This process includes significant time spent observing field activities.
- The schedule provides sufficient time to establish the required facts.
- Facts are confirmed to be accurate and complete by the counterpart.
- Findings consist of areas for improvement and strengths. The strengths reported should be based on methods or practices that could be applied to other plants.
- Areas for improvement are factual, focused and worthwhile. They describe the real problems and are written in a compelling manner that urges the organization to take action. They include the nuclear safety consequences if no action is taken.
- An appropriate method is established to determine the validity of the areas for improvement.
- The absence of areas for improvement should be challenged by considering the following factors;

- plant performance in subjected area,
- qualification of reviewers and appropriate mind set,
- rigour of approach, opportunities for observations,
- adequacy of scope.

Review of findings

- The plant is given an opportunity to comment on the validity of the issue prior to the completion of the evaluation
- The findings are subject to a review, prior to the issue of the final report, by manager(s) or director(s) uninvolved in the process.

Determination of generic findings

- Analysis takes place to determine if generic problems are occurring in a series of reviews and a process is in place to identify them.
- Reviews of the corporate performance are carried out if areas for improvement;
 - have existed for several reviews,
 - are generic in nature,
 - appear to have causes beyond the control of the NPP.

Other review processes

- Check if other review processes exist within the utility, e.g., review of specific topics. Determine if the combination of all the existing processes is complementary and does not conflict.

4.1.4. Follow-up

Expectations

To confirm that areas for improvement identified are acted upon, follow-up is required and is an important part of the process.

Investigations

- A method exists for following up areas for improvement after an appropriate time period to determine if reasonable progress has been made.
- The follow-up method should be an integral part of the safety review process, i.e., this follow-up may be performed by specific assessment, review of plant reports or within a programme of self-assessment.
- The plant provides information on the status of each area for improvement to prepare for the follow-up.
- Each evaluation specifically states the areas for improvement of the previous evaluation in a consistent way and makes a determination on the suitability of the actions already taken and those proposed for future action. When possible, the adequacy of the corrective action taken should be based on performance results.

4.1.5. Corporate support

Expectations

The responsibility for effectiveness of a safety review programme rests within the corporate organization. Commitment to continuous improvement should be demonstrated at senior levels in the organization. The responsibility should be at an appropriate level to facilitate the involvement of the required number of individuals to support the programme.

Investigations

- A corporate policy statement clearly endorses the safety review programme.
- The programme should report to at least a level higher than the organization reviewed as a principle.
- The policy is reinforced by corporate acts such as active participation in the process.
- The results of evaluation are an integral part of performance evaluation and given priorities at the plants and in the corporate organization.
- The corporate organization ensures that corrective actions are completed.
- The corporate organization has mechanisms to disseminate applicable findings throughout the organization as well as the corrective actions applied.

4.2. Organization and administration of the programme

4.2.1. Organization

Expectations

To bring benefit of safety review missions to plants, the organization should have sufficient staff with knowledge and experience of power plant operation. The size and structure of the organization will influence the strategy of a safety review programme.

Investigations

- Sufficient manpower and financial resources are assigned to sustain the objectives of the programme and adequately organize the reviews of plant activities.
- A programme is established to keep staff with appropriate qualifications and experience to ensure they have the ability to carry out their duties and also to ensure that they have credibility with plant staff. This should include training and may be supported by rotation of plant personnel into the organization.
- Active participation in the programme by plant management and peers is recognized.
- The required authority to effectively carry out the programme is established.

4.2.2. Planning

Expectations

Adequate planning and scheduling is the backbone of a well managed programme but in the case of safety reviews is especially important given the extraordinary nature of the activities, the diverse interfaces and the number and responsibilities of individuals.

Investigations

- Sufficient scheduling is conducted to ensure that reviewers are provided as required.
- Meeting(s) are held with the plant prior to the review to explain the methodology. These meetings are held with sufficient lead time that the plant can adequately prepare for the review.
- Co-ordination between the safety review mission and other plant or utility activities is taken into account to avoid unnecessary conflict and availability of personnel on obtaining the maximum benefit.
- Operational safety reviews are scheduled at an appropriate frequency.

4.3. Personnel

4.3.1. Team composition

Expectations

To maintain consistency between safety review missions, a team should include member(s) experienced and familiar with the programme. Participation of new reviewers should be encouraged to increase staff exposure to the process and sustain the programme.

Investigations

- Sufficient number of reviewers with adequate qualification and experience are included in the review team to cover the identified scope.
- An appropriate balance between new and experienced reviewers is established to sustain the programme and achieve consistency between reviews.
- A plant counterpart is designated for each functional area to interact with the reviewer(s).
- A representative of the plant under review may participate in the review team. If this is the case, responsibilities should be well defined and understood.

4.3.2. Qualification

Expectations

To fulfil the responsibilities as reviewers, the safety review team members should have adequate qualifications and experiences which are commensurate with the responsibilities assigned.

Investigations

- The required qualifications and experience for a team leader and reviewers are documented.
- The qualifications of the team members match documented requirements.
- Team members are selected based on qualifications, experience and ability to conduct interviews and observations in a professional manner.

- Reviewers may be recruited from the utility, from other utilities, countries or outside the nuclear industry.

4.4. Reporting

Expectations

A final report documenting the operational safety review is a requirement of the programme. The report will help the plant understand the issues and encourage the organization to implement the necessary corrective actions. The report should contain the areas for improvement and strengths identified and may include recommended actions.

Investigations

- The purpose of the report and the responsibility for generating and controlling the report should be clearly defined.
- Areas for improvement should be factual, focused and worthwhile. They should be written in a compelling manner that urges the organization to take action. They should include the nuclear safety consequences if no action is taken.
- The production of the final report involves the utility, the plant and the team members.
- The time interval to produce the final report is sufficient to provide a quality report but not excessively long to impair the implementation of the corrective actions. The status of reports being prepared is adequately tracked.
- Mechanisms are established to ensure that the plant have the opportunity to comment on the drafts for discussing and sending the proposed changes.
- If the team is not expected to get together in the future, the draft report should be technically completed, only minor editorial or clarification changes should be permitted.
- The reports are written in a consistent format to provide a common basis for judgement, to permit comparison of results between different facilities and to enable identification of generic issues.
- The format and structure of the report and classification of results should permit easy retrievability.
- The report should contain a reference number and a date of issue. It may contain the names and the affiliations of participants and definitions of relevant terms.
- Abbreviations should be explained unless they are sufficiently clear within the organization; jargon should be avoided; posts should be referred to instead of the proper names of staff.
- The report should be designed in such a way that the results of the follow-up can be linked with the issues of the previous mission.

4.5. Effectiveness of the process and feedback

4.5.1. Effectiveness

Expectations

Operational safety review programme should be periodically reviewed for effectiveness.

Investigations

- The safety review programme should be periodically reviewed against the safety performance of the organization, the execution of the programme and the accuracy of the findings. This can be done by analysing, e.g.,
 - performance indicators
 - safety assessment reports from other organizations
 - root causes of events
 - repeated areas for improvement
 - disagreement of plant personnel with the process or the results.
- Feedback of corrective actions in other plants of the utility or organization when applicable
- Good practices are disseminated throughout the utility. Number of them that are implemented in other plants

4.5.2. Feedback/improvement process

Expectations

To continuously strengthen the safety review programme, a sound feedback process should exist and be in place together with monitoring effectiveness of the programme.

Investigations

- Feedback information can be collected from various sources described below;
 - feedback from the plant and team members after a safety review is conducted
 - feedback from internal and external organizations
 - plant comments to the reports.
- Feedback information is recorded and regularly reviewed to identify possible improvements.
- Corrective actions to the safety review process based on the feedback are taken.
- Ideas from similar review programmes are taken into consideration to strengthen the system.
- Meetings are held between nuclear power plants within the utility and safety review co-ordinators to measure the effectiveness of the programme, latent problems and future directions.

4.6. Documentation

Expectations

Appropriate documentation should be stored and easily retrievable to facilitate generic analysis and periodic reviews of effectiveness.

Investigations

- The structure of documents related to the safety review programme is well established, controlled and managed.
- A documentation control system is in place to ensure that programme documents are adequately authorized, updated and distributed and to ensure the confidentiality required by the programme and the availability of the reports as required.
- Historical safety review records are systematically documented and easily retrievable. Reference to mission conducted and follow-ups.

4.7. Team training

Preparatory work

Prior to the assessment of the safety review team training the following information should be made available to the assessment team:

- training material
- roles and responsibilities of team members.

Expectations

To enhance the team performance, training for safety review team members should be provided and be commensurate with responsibilities assigned. The training should be carried out prior to the mission and participants should be trained on the methodology, investigation (interview and observation) skills, team work, reporting, team leader expectations, etc.

Investigations

- There is sufficient training documentation and guidance to prepare for the review. This training material should cover all the activities pertaining to the safety review, e.g., methodology, interviews, reporting, etc.
- The training materials will be supported by other communications means, e.g., videos, transparencies, slides.
- The duration of the training is sufficient to cover all necessary elements.
- The training is carried out effectively and includes exercises to ensure adequate comprehension of the material by the reviewers being trained. The training is consistent with the documented training programme.
- The participants show interest in the training and actively participate in discussions, training activities and exercises.
- Reviewers are recognized for their demanding task, to help motivation.

4.8. Preparatory activities of the safety review team

Expectations

To conduct the safety review effectively in a limited time, reviewers should understand plant performance, identify potential strengths, areas for improvement and be qualified for unescorted access to the plant.

Investigations

- The reviewers have analysed plant information, and especially the plant performance and events, to make initial review plans.
- The topics to be reviewed are determined and discussed with counterparts.
- The schedule of the review is planned and agreed with counterparts.
- Effective co-operation between different team members on planned activities is considered if needed.
- Questions to be clarified are prepared.

4.9. Safety review process

Expectations

To meet the objectives of the safety review mission, the principles and methodology of the programme need to be rigorously applied. Other success factors include; effective team leadership, co-operation among team members and co-operation between team members and counterparts.

Investigations

— General aspects of safety review

Specific aspects to be observed include:

- The safety review leadership is effective in managing the team and issue development. This role is recognized by team members and plant counterparts.
- Safety team members show sufficient investigation and interviewing skills.
- All areas are represented in daily discussions and final results.
- Effective communication and co-operation exists between the team leadership and team members and amongst team members. Views and opinions from other functional areas are considered. Constructive criticism from other team members is accepted.
- Observations include all aspects of the activity not only those which lie within the responsibility of the reviewers. Such aspects are communicated to other team members.
- Professional discussions occur between team members and counterparts.
- The team adheres to the established scope of review. Deviations are agreed by the team leader.
- A prudent and rigorous approach to uncover the reasons why problems exist should be demonstrated.

- Perception by plant management personnel and counterparts of the safety review programme and the mission is appropriate.
- Expectations for the use of process documentation (guidelines, etc.) should be demonstrated by team members.
- If there is a plant representative in the safety review team, check the scope of his participation and assigned responsibilities.

— *Safety review activities at the offices of the plant*

Review the adequacy of following areas:

- Interviews between safety review team members and counterparts, tone, location, openness, co-operative attitude, adequacy of the questions and responses, methodology used for interviews, prior preparations, supply of documentation and records under request.
- Team meetings, effectiveness and control of the meetings, duration, equal participation of all team members, assignment of responsibilities by the team leaders, co-operative attitude between team members, general awareness of all the issues by each team member,
- Counterparts meetings. Areas of concerns identified during the review are known by counterparts and regularly reported to the plant management or his deputy. Corrective measures taken by the counterparts should be avoided. However, counterparts may take action in accordance with plant procedures if safety or equipment damage is likely. Unclear issues are clarified and supportive information is requested in the counterpart meetings,
- Regular meetings between the safety review team leader and the plant manager occur to discuss issues identified and progress of the review,

— *Safety review activities in the field*

Observations of safety review investigations will provide evidence that principles and methodology are appropriate to conduct field reviews, that adequate importance is devoted to this subject and that the status of the plant reflects the content of the reported findings. During the assessment, several topics should be considered for investigation such as:

- Plant tours are carried out to all relevant buildings of the plant with special emphasis placed on those containing safety related equipment. Plant tours should be carried out with attention to detail. Observations should include material condition of the equipment, building conditions, housekeeping, buildings and equipment identifications(labeling), lighting, communication and workers and supervisors performance.
- The standards of reviewers towards identifying and reporting deficiencies should be noted. Conclusions reached on the plant and equipment status may be a good indicator of these standards.
- Work in progress being reviewed. Sufficient work in complexity and diversity should be observed to have an understanding of the performance in this area. No special measures are taken to prepare the work to be reviewed. During the review workers and supervisors should be interviewed and requested to demonstrate with examples to support their views. Enough time is provided to assess certain

activities, e.g., operations in the control room, maintenance activities, safety modifications, etc.

The purpose of these observations is to gather sufficient information to form a view of plant equipment condition and work practices in order to confirm that the safety review methodology and the peers used, are capable of identifying and reporting the issues in the field.

4.10. Safety review report

Preparatory work

Prior to the assessment of the safety review report the following information should be made available to the assessment team:

- observation reports
- safety review report
- plant comments to the safety review report
- other NPP reports.

4.10.1. General

Expectations

The report is the end product of the safety review mission as such, it should be clear, developed from observations and analysis of the team and sufficiently compelling to urge the organization to take action.

Investigations

- The format and structure of the draft and final report are consistent with the industry standards and to facilitate comparison with other NPPs reports.
- Examples are included to demonstrate scope and significance of areas for improvement.
- The report is sent to the plant for comments without delay.
- Excessive attempts to dilute the significance of areas for improvement are prevented.
- Substantial technical changes to the report are discussed with the appropriate safety review team member.

4.10.2. Results

Expectations

To meet programme objective, the areas for improvement and recommendations presented within the report need to be clear and concise.

Investigations

- Areas for improvement should describe problems and possible consequences. They should be sufficiently supported by facts.

- Recommendations to solve the issues, are not overly prescriptive and are formulated in such a way allows the plant to decide its preferred course of action.
- The recommendations address the underlying causes.
- The quality of the findings should ensure that the plant improves the performance.
- The comparison of reports may be used to develop information on the consistency of the standards applied and dissemination of the results within the utility or the organization. No contradictions are found between strengths and weaknesses.
- Repetition of similar issues and recommendations in previous reports will provide indications of insufficient dissemination of findings within the utility, inadequate corrective measures or possible lack of direction to resolve common issues.
- Good practices identified are valid and well described. The information contained in the good practices permit other nuclear power plants to understand and judge the benefit of their implementation.
- Repetition of similar good practices may indicate insufficient dissemination of good practices within the utility or that they are unclear or/and inadequate.

4.10.3. Comments on the report

Expectations

The safety review report is accepted and utilized by plant staff to enhance safety. Plant staff should be given opportunities to express comments on the report and those comments should be considered by the safety review organization. However, it is desirable that the report be accepted at the time of safety review and no essential change be made after the safety review.

Investigations

- Plant management responds in a timely manner to the safety review team leader by discussing and sending the proposed changes.
- The management of comments includes these from the persons in charge of the areas reviewed and from other plant staff.
- Professional attitude from the plant to the safety review recommendations is observed in the plant responses.
- Comments by the plant are discussed between the plant and the safety review organization and included final report if necessary.
- The number of modified issues should be minimized.

4.10.4. Follow-up reports (if applicable)

Expectations

To evaluate effectiveness and progress of the measures implemented by the plant to correct the weaknesses identified at the safety review and encourage continuous improvement, a follow-up to the plant should be carried out after the safety review and the results should be clearly documented.

Investigations

- The plant has taken adequate corrective actions on all issues.

- There is a method to identify the corrective actions based on the status at the time of the review such as: AFI completed, resolved or satisfactory or unsatisfactory progress.
- The follow-up report and results should be linked to the original report.

4.11. Main conclusions

Expectations

The safety review programme should be effective to improve nuclear safety in the utility as well as in individual plants in a measurable way.

Investigations

Ambitions and expectations

- Ambitions and expectations of the programme are stated in a utility's top level document.
- The safety review programme focuses on nuclear safety and has objective to improve nuclear safety.
- The programme has ability to correct areas for improvement and repeated areas for improvement are not observed.
- Weak signals are recognized by the safety review programme before events happen in the plant.

Conditions and resources

- Perception of the programme is recognized in the utility.
- The programme reports to an appropriate management level to be efficient to take action.
- Appropriate qualified and financial resources are dedicated to the programme.

Realization and execution

- The safety review process and results are sufficiently critical, rigorous and probing in all operational areas.
- Management of change is reviewed in the programme.
- Human performance and work behavior are taken into consideration in the programme.
- Reports are technically accurate.
- The programme disseminates strengths to other plants.

Continuous improvement

- Performance indicators are developed and periodic evaluations of effectiveness are conducted.
- Improvement plans for a certain time period are documented and actions are implemented timely.
- Trends of improvement of nuclear safety are evaluated and disseminated inside the utility.

Note: This section will be used to develop the summary of an assessment. Therefore, the evaluation should be based on the overall perspective and shall not conflict with the assessment of specific areas. All team members should contribute in developing the main conclusion.

GLOSSARY

Safety review: review of operational safety at nuclear power plants conducted by peers recruited within the operating organization or abroad.

Safety review team: the team responsible for conducting the safety review, and therefore to assess the operational safety performance of the plant.

Assessment of the safety review: assessment of the safety review carried out by IAEA experts.

Assessment team: the team responsible for conducting the assessment of the safety review programme, mission and results.

Findings: the issues and strengths identified.

Results: the suggestions made to the utility and the good practices identified in the systems for the benefit of other safety review programmes.

BIBLIOGRAPHY

INTERNATIONAL ATOMIC ENERGY AGENCY, OSART GUIDELINES 1994 Edition, IAEA-TECDOC-744, Vienna (1994).

INTERNATIONAL ATOMIC ENERGY AGENCY, Self-assessment of Operational Safety for Nuclear Power Plants, IAEA-TECDOC-1125, Vienna (1999).

CONTRIBUTORS TO DRAFTING AND REVIEW

Pilot mission to the United Kingdom, 1998

Diaz Francisco, J.M.	International Atomic Energy Agency
Domenech, M.	International Atomic Energy Agency
Taylor, R.	International Atomic Energy Agency

Pilot mission to France, 2000

Bhiksham, R.	Kakrapar Atomic Power Station, India
Bull, P.	British Energy, United Kingdom
Diaz Francisco, J.M.	International Atomic Energy Agency
Domenech, M.	International Atomic Energy Agency
Grauf, E.	Gemeinschaftskernkraftwerk Neckar GmbH, Germany
Hansson, B.	International Atomic Energy Agency

Consultants Meeting, 2001

Bhiksham, R.	Kakrapar Atomic Power Station, India
Bull, P.	British Energy, United Kingdom
Grauf, E.	Gemeinschaftskernkraftwerk Neckar GmbH, Germany
Pot, N.	Electricité de France (EDF), France
Hansson, B.	International Atomic Energy Agency
Yoshihara, K.	International Atomic Energy Agency