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PROSPER guidelines

*Guidelines for peer review and for
plant self-assessment of
operational experience feedback process*



INTERNATIONAL ATOMIC ENERGY AGENCY

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PROSPER GUIDELINES: GUIDELINES FOR PEER REVIEW AND FOR PLANT SELF-
ASSESSMENT OF OPERATIONAL EXPERIENCE FEEDBACK PROCESS

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FOREWORD

PROSPER stands for peer review of the effectiveness of the operational safety performance experience review. The aim of this IAEA service is to provide advice and assistance to Member States to enhance the safety of nuclear power plants throughout their operational life cycle, from construction and commissioning to decommissioning. PROSPER, initiated in 2000, is available to all countries with nuclear power plants under commission or in operation.

Conservative design, careful manufacture and sound construction are all prerequisites for safe operation of nuclear power plants. However, the safety of the plant ultimately depends on effective management, sound policies, procedures and practices, on comprehensive instructions, on adequate resources and on the capability and reliability of the commissioning and operating personnel. A positive attitude and conscientiousness on the part of the management and the staff to learn lessons from internal and external experience is extremely important in enhancing safety.

PROSPER missions consider these aspects in assessing the effectiveness of a nuclear power plant's or utility's operational experience feedback process. The review considers compliance with the intent of the safety standards established by the IAEA. Although these standards establish an essential basis for safety, the incorporation of more detailed requirements in accordance with national practice or international best practices may also be necessary. Moreover, some special aspects might need to be assessed by experts on a case by case basis.

The IAEA Safety Series publications, including the Nuclear Safety Standards (NUSS) for nuclear power plants, and the International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources, and the expertise of the PROSPER team members themselves, form the bases of the review. The PROSPER guidelines provide overall guidance for the plant or utility to prepare a self-assessment report on the effectiveness of its operational experience feedback process and for the experts to ensure the consistency and comprehensiveness of the review.

PROSPER missions are performance oriented in that they accept different approaches to operational experience processes that represent good practices and may contribute to ensuring a good safety record on the part of the operating organization. Recommendations are made on items of direct relevance to safety, whereas suggestions made might enhance plant safety only indirectly but would certainly improve performance. Whenever this is relevant, commendable good practices identified at given plants are communicated to other plants so that these plants may incorporate them into their own practices.

The PROSPER service, focusing on the effective use of operational experience, is one of a suite of complementary services offered by the Division of Nuclear Installation safety of the IAEA. Other services include:

- OSART (Operational Safety Review Team)
- SCEP (Safety Culture Enhancement Programme)
- IRRT (International Regulatory Review Team)
- IPSART (International Probabilistic Safety Assessment Review Team)
- INES (International Nuclear Event Scale Information Service)

- IRS (Incident Reporting System)
- IRSRR (Incident Reporting System for Research Reactors).
- INSARR (Integrated Safety Assessment of Research Reactors).

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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.

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1. INTRODUCTION

Effective use of operational performance information is an important element in any plant operator's arrangements for enhancing the operational safety of a nuclear power plant (NPP). This has been recognized in the IAEA Safety Fundamental, The Safety of Nuclear Installations (Safety Series No. 110). Under the technical aspects of safety, one of the principles of operation and maintenance is that "the operating organization and the regulatory body shall establish complementary programmes to analyse operating experience to ensure that lessons are learned and acted upon. Such experience shall be shared with relevant national and international bodies".

The Convention on Nuclear Safety, which entered into force in July 1996, also recognized the importance of operational experience feedback as a tool of high importance for the safety of nuclear plant operation and its further enhancement. Article 19 of the Convention concerning Operation requires that each contracting party shall have appropriate steps to assure, among others, that:

- incidents significant to safety are reported by the holder of the relevant license to the regulatory body;
- processes to collect and analyse operating experience are established, that results obtained and the conclusions drawn upon and that mechanisms are used to share important experience with international bodies and with other operating organizations and regulatory bodies.

It follows that the arrangements and results achieved under the operation experience feedback process in Member States will be covered by the national report under the Convention and will be subject to periodical review.

These principles are further expanded in the IAEA Safety Standards "Safety of Nuclear Power Plants: Operation" (Safety Standard Series No. NS-R-2, year 2000) under the "Feedback of Operating Experience" which requires that:

- "Operating experience at the plant shall be evaluated in a systematic way. Abnormal events with important safety implications shall be investigated to establish their direct and root causes. The investigation shall, where appropriate, result in clear recommendations to plant management who shall take appropriate corrective action without undue delay. Information shall be fed back to the plant personnel."
- "Similarly, the operating organization shall obtain and evaluate information from the operational experience at other plants which provides lessons for the operation of their own plant. To this end, the exchange of experience and the contribution to national and international data is of great importance."
- "Operating experience shall be carefully examined by designated competent persons to detect any precursors of conditions adverse to safety, so that corrective action can be taken before serious conditions arise."
- "All plant personnel shall be required to report all events and encouraged to report near misses relevant to the safety of the plant"
- "Plant management shall maintain liaison as appropriate with the organizations (manufacturer, research organizations, designer) involved in the design, with the aims of feeding back operating experience and of obtaining advice, if needed, in the event of equipment failures or abnormal events"

- “Data on operating experience shall be collected and retained for use as input for the management of plant ageing, for the evaluation of residual plant life and for probabilistic safety assessment and periodic safety review.”

The IAEA-led **Peer Review** of the effectiveness of the **Operational Safety Performance Experience Review** process (PROSPER) and associated guidelines have been developed to provide advice and assistance to utilities or individual power plants to strengthen and enhance the effectiveness of operational experience programmes in achieving these fundamental objectives. The objectives of the former IAEA Assessment of Significant Safety Events Team (ASSET) service have been expanded to include an evaluation of the effective use of all operating performance information available to the plant (e.g. external operating experience, internal low-level and near miss event reports and other relevant operating performance information, such as performance indicators and Quality Assurance non-compliance reports). The typical input and output of PROSPER information is illustrated in Fig. 1.

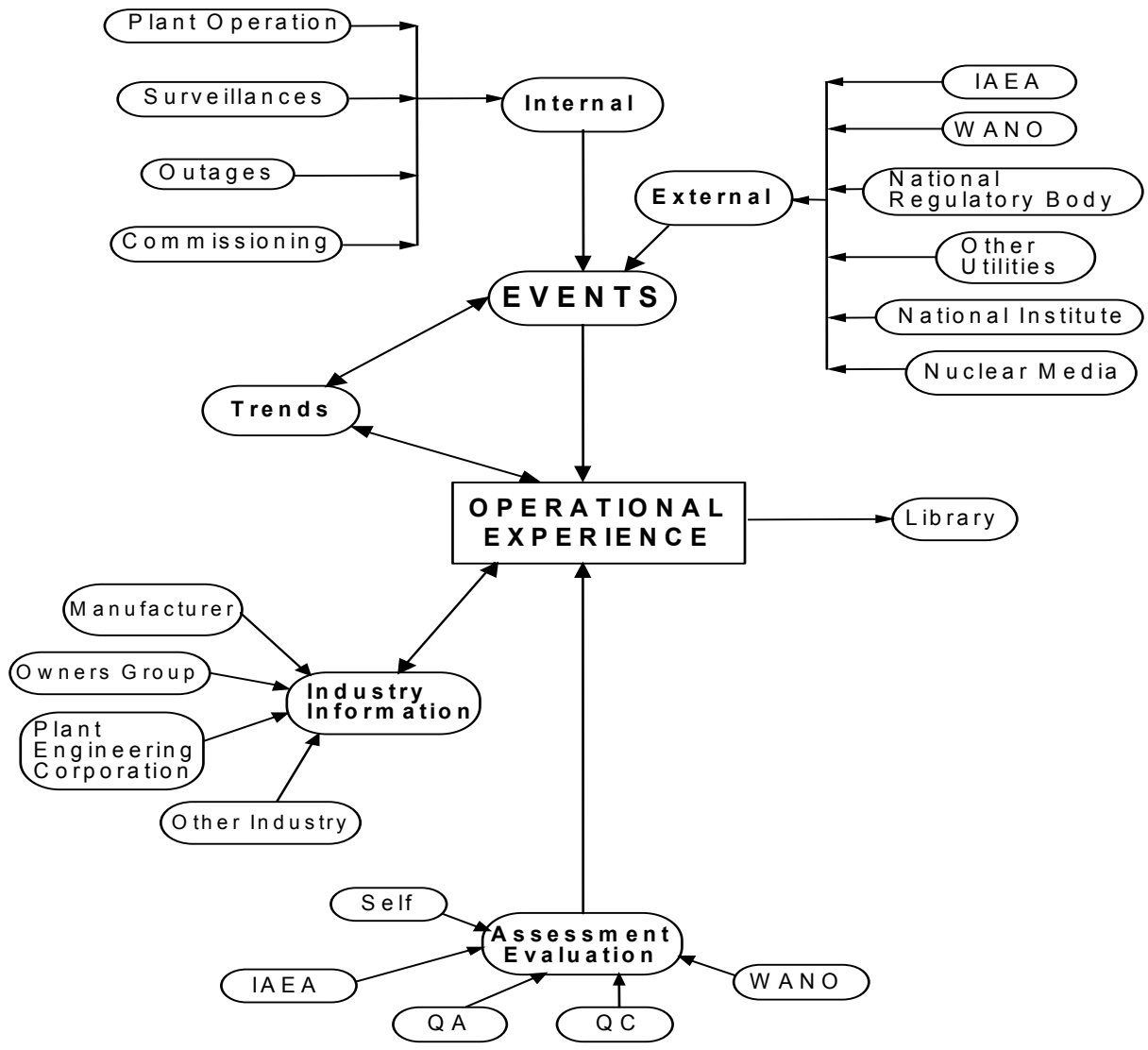


FIG. 1. Typical input and output of PROSPER information.

The major objectives of the peer review are the determination of whether the existing operational experience (OE) process meets the best internationally accepted practices and identification of areas for future improvement. Also to determine of whether the operational experience processes are being effectively managed, that the stated expectations and standards are being achieved and maintained, and that significant generic issues are being adequately identified and timely rectified and that adequate comprehensive operational experience processes are in place to enhance operational safety performance.

A PROSPER mission is a review of the effectiveness of the plant OE processes and/or a review focused on specific significant events or issues (Fig. 2).

The guidelines set down in this report are primarily intended for IAEA-led PROSPER team members as a basic structure and common reference. However, the guidelines have also been designed to provide guidance to utilities or NPPs carrying out self-assessments. The guidelines are intended to be generic, recognizing that there will be differences between utilities and that the scope of the reviews may vary.

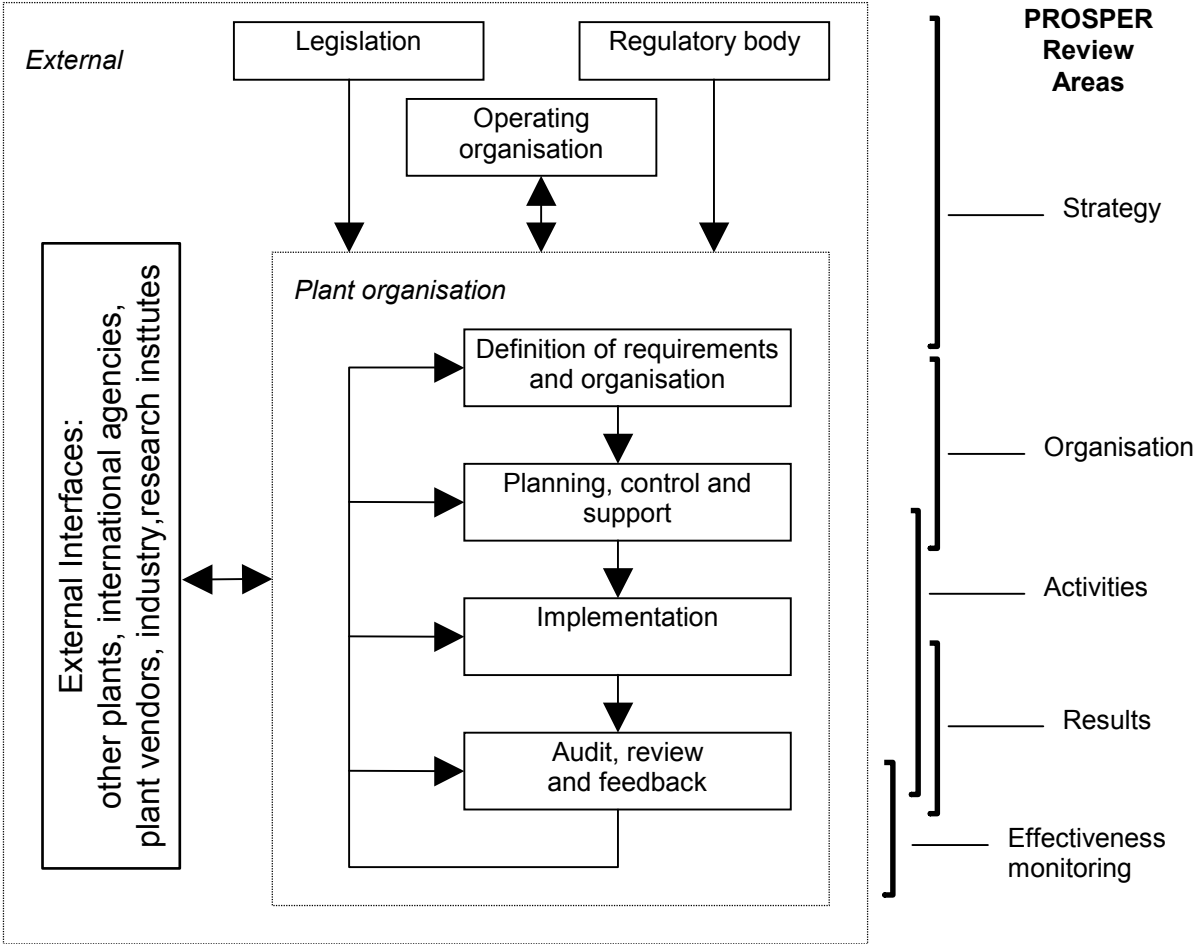


FIG. 2. Chart showing the management of the operational experience process to enhance safety.

It is recommended that utilities or NPPs conduct their own self-assessment of the effectiveness of their operational experience processes. The IAEA-led PROSPER team can then review the effectiveness and comprehensiveness of the plant self-assessment and offer comments and recommendations to further enhance the conclusions of the self-assessment.

IAEA-led PROSPER missions compare, as far as possible, the operational experience processes for an NPP with guidance and equivalent good practices. These are based on guidance on safety practices produced by the IAEA and other international organizations and the expertise of the PROSPER members themselves.

PROSPER missions are process performance related in that they accept different approaches to the implementation of operational experience processes, depending on the organization of the NPPs. Recommendations are made on items of direct relevance to operational safety performance. Suggestions made may enhance the effectiveness of the operational experience processes and may also stimulate the NPP staff to consider other ways and means of improving it. Commendable good practices identified should be communicated to other utilities or NPPs for improvement consideration.

The findings of the PROSPER mission are formally reported to the utility management along with the corrective actions agreed by the NPP. It is suggested that, at the request of the operating organization or member state, an IAEA-led Follow-up review mission is conducted within 18 months of a full PROSPER mission. The IAEA-led PROSPER Follow-up review mission will review the progress achieved by the plant in implementing the agreed recommendations made by the mission and also in correcting the deficiencies identified through the self-assessment. This evaluation will determine the effectiveness of those actions in improving the operational safety performance processes.

The present guidelines are intended to assist members of an NPP or utility self-assessment team to identify and acquire the information relating to the self-assessment of their operational experience process, which they require to conduct a satisfactory assessment. These guidelines are intended to promote thought, rather than be prescriptive.

Section 2 of these guidelines gives guidance aimed at assisting the utility or plant in conducting a satisfactory self-assessment on the effectiveness of their operational experience review process. Section 3 details the logistics of preparing, conducting and reporting the PROSPER mission process. Section 4 gives guidance aimed at assisting IAEA-led PROSPER team members in conducting the PROSPER mission.

2. GUIDELINES FOR THE DEVELOPMENT OF A PLANT SELF-ASSESSMENT REPORT ON THE EFFECTIVENESS OF ITS OPERATIONAL EXPERIENCE PROCESS

2.1. OBJECTIVE

It is recognised that it is important to include into operational safety performance experience review process all operational experience information to ensure that unknown/unrecognised safety implications do not go undetected and therefore the term *operational experience process* will be used. A flowchart of a typical operational experience process is shown in Fig. 3.

Every utility/NPP should have its own operational experience process. This OE process should encompass internal and external experience and should be able to incorporate the consequent lessons learned, in order to enhance the operational performance of the plant.

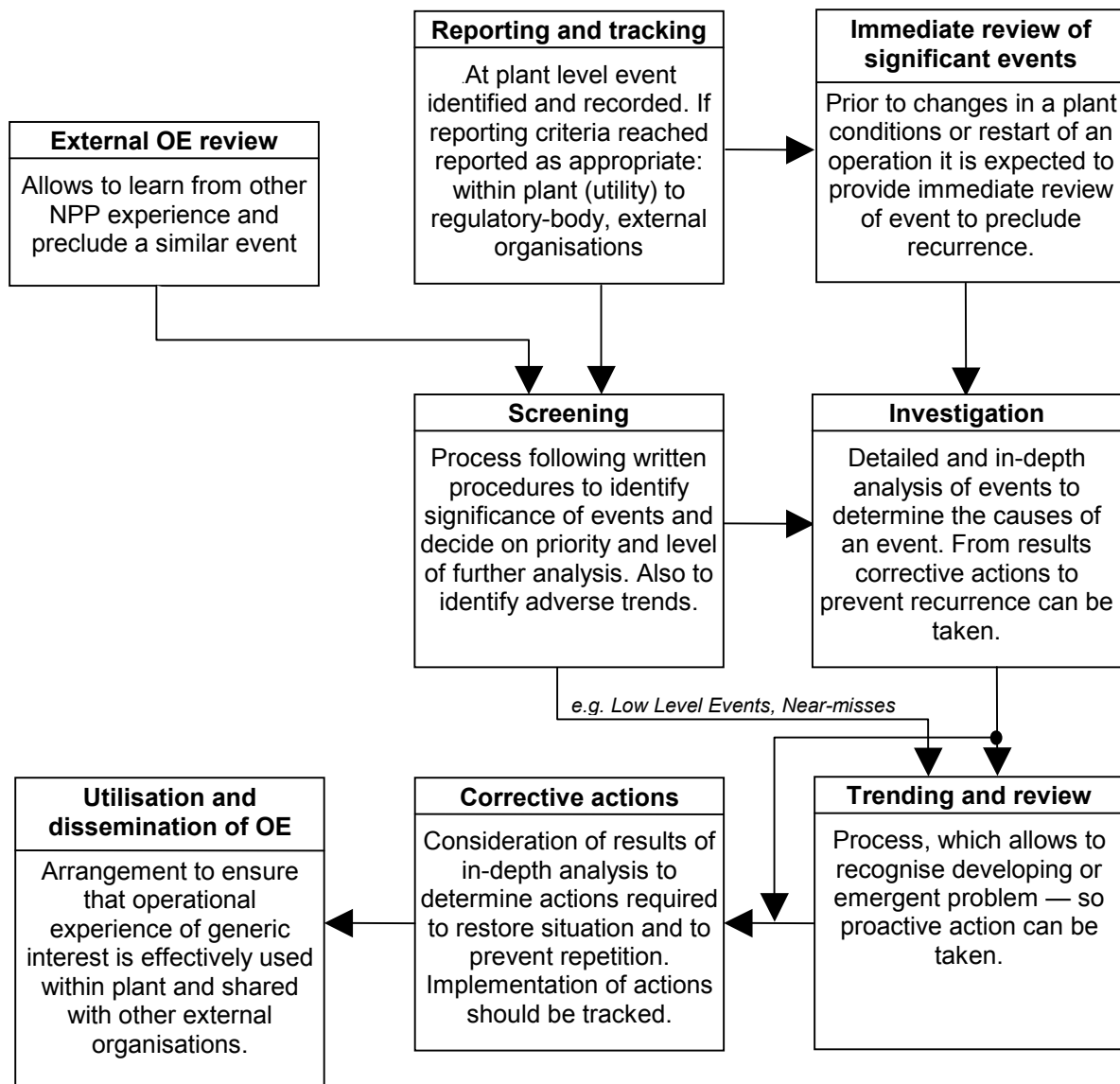


FIG. 3. Flow chart of a typical operational experience process.

Some typical questions to be answered by the plant management are:

- Is this OE process adequate?
- Does it cover the low level events and near misses as well as all significant events?
- Is root cause analysis applied to all the major and supporting organizational activities involved in these significant events? (Examples of plant organizational activities are: operation, maintenance, configuration management, ageing management, modification management, work control, etc.).

Note: In this document any operational deviation (a noticeable or marked departure from the expected norm/standard/expectation), abnormality, equipment or human failure, procedure non-conformities, etc. is considered as an event.

To respond to these questions, a self-assessment methodology to review the effectiveness of the operational experience process should be developed and implemented at the plant.

These guidelines have been developed to provide advice and assistance to utilities or individual power plants to strengthen and enhance their own operational experience process through critical self-assessment.

By conducting a critical self-assessment of the process, OE may be optimised, leading to continuous improvement. This may be achieved through regular effectiveness reviews. Determination of whether the operational experience processes are being effectively managed, that the stated expectations and standards are being achieved, maintained, and improvement sought, and that significant generic issues are being adequately identified and timely rectified are the major objectives. The IAEA-led PROSPER review utilises the plant self-assessment as the basis for its evaluation. If a utility operates more than one NPP then it may also be appropriate to perform a self-assessment at the corporate level.

The objective of an operational experience process is to ensure that all available information is properly used to improve operational safety. To achieve this objective it is necessary to ensure that:

- the collection of information in timely manner is sufficiently comprehensive that no relevant data is lost (this requires broad reporting criteria and low detection thresholds);
- the information collected is screened effectively to ensure that all important safety related issues, that should be reported and analysed with priority, will actually be identified (this requires clear ranking criteria);
- the issues identified are analysed in sufficient depth to permit the identification of underlying root causes with respect to equipment, personnel and procedures,
- the corrective actions are implemented in timely manner to prevent the recurrence of similar events caused by similar root causes;
- the lessons learned are disseminated promptly and widely to enable other utilities in both nationally and internationally to take corrective actions before similar events occur.

To ensure that the plant arrangements meet these objectives, it is necessary to carry out periodic self-assessments.

2.2. AREAS FOR SELF-ASSESSMENT

The guidance has been developed for the following areas of the self-assessment of the OE process (see more details in Table I):

- strategy,
- organization,
- activities,
- results,
- effectiveness monitoring.

Each self-assessment review area is subdivided into:

- attributes,
- documentation,
- review topics.

The “attributes” subsection gives desirable characteristics of an OE process relating to the review area.

The “documentation” lists information which should be utilized for the self-assessment review. It is expected that the information will be contained within various plant documents and not necessarily in specific OE documents, for example: deficiency/deviation reporting expectations may be included in Conduct of Operations, Conduct of Maintenance, etc. documents.

The “review topics” are intended only to act as pointers, indicating specific topics or activities within the oe processes which should be critically reviewed. These suggested topics may not cover all topics or activities associated with the oe process and therefore addressing all of them does not necessarily mean that the oe process has been fully reviewed. Above all, they should not be used as a yes/no checklist, or used to constrain the reviewer. Judgement should be used regarding the usefulness and applicability of any review topic to an npp. The self-assessment review topics should be updated based on experience and in accordance with relevant national and international codes and standards.

The relevant IAEA reference documents are listed in the Bibliography at the end of these guidelines.

TABLE I. AREAS OF SELF-ASSESSMENT

I-1	I-2	I-3	I-4	I-5
Strategy	Organization	Activities	Results	Effectiveness monitoring
<ul style="list-style-type: none"> • Regulatory policy and requirements • Utility/NPP policy and requirements • IAEA Safety Standards and other International guidance • Scope of OE process 	<ul style="list-style-type: none"> • OE process organization and description • Resources <ul style="list-style-type: none"> – human – financial – tools and equipment – external • Procedures 	<ul style="list-style-type: none"> • Identification (Reporting) • Data processing • Compliance to reporting criteria • Screening • Assessment, investigation, analysis • Trending and Trend review • Identification of significant issues • Review of external operating experience • Action management - corrective action setting, prioritization, tracking and accountability 	<ul style="list-style-type: none"> • Performance indicators • Physical condition of plant • Feedback from inspections, audits, evaluations, etc. • Recurring events • Safety significant events 	<ul style="list-style-type: none"> • Self-assessment • Continuous improvement OE process

2.3. STRATEGY

To provide timely identification, analysis and correction of adverse deviating conditions important to NPP safety, it is desirable that utility/NPP operators have in place a systematic OE process. The deviating conditions addressed by the OE process ranges from significant to near miss events and thus allow for the correction of initiators and prevention of their recurrence, which could lead to significant safety events. The OE process also includes a feedback mechanism to correct minor OE process deficiencies, which will then contribute to improved safety performance.

2.3.1. Attributes

The utility/NPP operator takes account of regulatory policy and guidance when establishing and implementing an OE process. The regulatory requirements or guidelines are regarded as minimum criteria.

In order that the OE process is effectively managed and retains credibility, the utility/NPP must make a positive commitment to its implementation and execution. The overall aim of the OE process is set out in a clear policy statement which commits the utility/NPP to the enhancing the prevention of events important to safety, i.e. the required capability of Process and activities to identify, analyse and eliminate latent weaknesses and hence prevent recurrence.

Due account is taken of any available national and international guidance including the IAEA Safety Standards and good practices in the OE process management.

The scope of the OE process is clearly defined and includes the identification of unresolved safety issues of a generic nature.

2.3.2. Documentation

- a) regulatory policy and requirements (nuclear, health and safety, environmental, etc.)
- b) international guidelines (IAEA, WANO, INPO, NEA, etc.)
- c) operational experience review policy of the utility/NPP
- d) reporting criteria (regulatory, utility, plant).

2.3.2. Self-assessment review topics

- a) Is the policy of the nuclear safety regulatory authority on operational experience review complied within the written plant guidance documentation?
- b) Are any additional regulatory requirements and guidance provided by other bodies (environmental, health and safety, etc.) included in the written plant guidance documentation?
- c) Within the operational experience review policy documentation of the NPP, are there clear policy statements regarding:
 - the use of OE results;
 - the operator's commitment to the OE process;
 - regular effectiveness reviews (e.g. monthly) and self-assessments (e.g. yearly);
 - the operator's intent to continuously improve performance through the use of OE review.

- d) To what degree has the NPP OE process used available international guidance and good practice?
- e) Is the scope of the NPP OE process comprehensive, does it include requirements for low level events, near misses reporting, etc.?

2.4. ORGANIZATION

Various OE processes used to identify problems, such as deficiency reporting, event reporting, preventive maintenance, in-service inspection, surveillance testing, routine plant monitoring, external event review, procedure review, and personnel re-qualification, etc., together with comprehensive analysis and co-ordinated corrective action, contribute to the ability to systematically utilize OE information effectively to enhance operational safety performance. Organizational problems may exist because the division of responsibility for relevant OE processes is distributed among several organizations including operations, maintenance, technical support and engineering within the NPP. To effectively gather, manage and utilize OE information to prevent recurring problems, these divisions of responsibility require co-ordination and integration.

Many of the OE processes are longstanding and were developed in response to both safety and economic objectives. As a result, gaps may exist between the OE processes relevant to managing operational experience. Due to possible gaps, and without co-ordinated and integrated mechanisms it is possible that utilities/NPPs may not have the most effective process as possible. Shortcomings may be overcome with a comprehensive, systematic and proactive OE process.

2.4.1. Attributes

The OE process should have a structure and organization which facilitates the satisfactory progress of all functions. This requires:

- a) a documented OE process;
- b) a manager with an appropriate background in NPP activities to oversee the OE process and supervise the OE organization;
- c) sufficient, suitably qualified and experienced staff within the OE process, capable of effectively performing OE process activities;
- d) adequate funding, facilities and equipment to maintain the OE process;
- e) suitably trained staff, knowledgeable in the need to identify and report deficiencies;
- f) sufficient numbers of qualified and well-trained operations, maintenance and technical support staff who understand the systematic OE process and are capable of performing required analysis tasks and support activities;
- g) formal integration into the management organization of the NPP;
- h) formal communication links with external organizations and other NPPs;
- i) mechanisms to incorporate industry operating experience into the in-house OE process.

2.4.2. Documentation

- a) description of the OE process structure and functions;
- b) description of the operating experience feedback system;

- c) description of the NPP activities contributing to the OE process and their interrelationships;
- d) profile description of operational experience review organization staff, identifying their qualifications, experience and training;
- e) description of how the OE process assesses internal event information, including low level and near miss event information, etc. Also a description of the process used to disseminate the information or take corrective action;
- f) description of how the OE process assesses external event information from other NPPs, international organizations and other relevant industries. Also a description of the process used to disseminate information or take necessary corrective action;
- g) descriptions of how the OE process utilizes plant specialist staff to assist with the analysis of events and deviations, including training given.

2.4.3. Self-assessment review topics

- a) Is the structure of all organizations participating in the OE process, together with their interfaces, clearly defined?
- b) Is the division of responsibilities between each of the participating organizations clear?
- c) Are the technical, professional and financial resources and resources to perform the tasks associated with the OE process adequate?
- d) Do the qualifications and experience required for staff actively engaged in the various aspects of the OE process meet defined plant requirements? Are these requirements adequate?
- e) What is the previous experience (operation, maintenance, engineering, technical support, etc.) of OE process personnel;
- f) Is the NPP training programme to ensure the competency of operating, maintenance, engineering and technical support staff to carry out OE process activities effective?
- g) Is there mechanisms for assessing the effectiveness of the OE process in enhancing the prevention of events in place?
- h) Is there an ability of the OE process organization to obtain expert support and advice when necessary?
- i) Is there a mechanism for obtaining and using advice from external and international organizations to enhance the OE process?

2.5. ACTIVITIES

In order that the OE process of the NPP is effective, several key activities have to be carried out. Each of these activities is regarded as essential and the OE process will not be effective if any one of them is omitted or inadequately performed.

2.5.1. Event reporting and tracking system

2.5.1.1. Attributes

A system is in place allowing for easy reporting of internal events by the NPP staff.

- a) Criteria for the level of deficiency, which requires submission of an Event Report, are provided to NPP staff and reinforced by management.

- b) The criteria include high level events/deficiencies which are significant to plant safety, and also low level events and near misses, thus allowing for the identification of significant and/or developing plant weaknesses. (A *near miss* is defined in IAEA Safety Standards Series No. NS-R-2 as: “a potentially significant event that could have occurred as the consequence of a sequence of actual occurrences but did not occur owing to the plant conditions prevailing at the time”. The safety significance of near misses is defined by the fact that in some other conditions, the outcome of the event might have significantly changed. *Low-level event* is defined in IAEA document Safety of Nuclear Power Plants: Design, Safety Standards Series No. NS-R-1 as discovery of a weakness or a deficiency (which includes the near miss) that would have caused an undesirable effect but did not, due to the existence of one (or more) defence in depth barriers).
- c) A tracking system is utilized to record the event reports. This system may have provisions for the control of corrective actions and provide information to be utilized for trending.
- d) Management encourages the NPP staff to identify and report all events including low level and near miss events.
- e) Staff is commended for event reporting.

2.5.1.2. Documentation

- a) Event Reporting Procedure (including thresholds, criteria, etc.)
- b) Event Report record keeping and tracking process description
- c) Event Report Form.

2.5.1.3. Self-assessment review topics

- a) Are staff knowledgeable of the event reporting process and reporting thresholds?
- b) How is the event reporting process communicated to staff (check on Plant)?
- c) How easy is it to report (check on Plant)? Where are the blank reporting forms stored? What is the availability of Event Report Forms/Logs in the field? Where is the initial report processed? How user friendly is the process (reporting easy, available access to results, information is made available to staff)?
- d) What are the identified and unidentified deficiencies in the field?
- e) How many reports are raised by each department?
- f) How systematic/uniform is process across various departments?
- g) How comprehensive is the event reporting? What is reported — events/deviations/performance shortfalls/QA findings, etc.?
- h) How proceduralized is process (check on Plant)?
- i) How are deviations captured?
- j) How is the report processed/tracked?
- k) How is feedback given to the staff who report the problem? Are any reports rejected?
- l) Are poor working practices and material condition being observed in the field? Are these reflected in events?
- m) Is the information reported centralized?
- n) Is the quality of the event reports sufficient (clear statements, correct description)?
- o) What is the contribution of all departments/sections to the event reporting process?
- p) What is the visibility of the reporting process?
- q) Is open reporting of own errors evident?
- r) Are the reporting thresholds complied with?
- s) Is management reinforcement of the reporting process evident?

- t) Is the reporting threshold appropriately chosen encourage the reporting of low level events?
- u) Are significant or recurring deficiencies identified in other processes (e.g. maintenance work management system) trended and reported into the OE process?

2.5.2. Screening for significance process

2.5.2.1. Attributes

The effective utilization of resources depends on appropriate screening of event reports after submission to determine significance of the event and the type of analysis to be performed. Types of analysis can vary from trend to full root cause analysis depending on the event significance. The requirement to make notifications to regulatory and the off-site authorities and utility representatives should be considered during the process. The screening process should consist of:

- a) Review of the event report by appropriate personnel for any immediate implications on the operation of the NPP.
- b) Review against specified criteria for notification of regulatory and other off-site authorities; and utility representatives.
- c) Determination of significance of the event for impact on plant safety (consequences and ability to learn the lesson).
- d) Review against established thresholds, consistent with the significance of the event, which determine the depth of analysis (or for instance, if only trending should be carried out or a full root cause analysis conducted).
- e) Assignment of the analysis to appropriate NPP personnel.

2.5.2.2. Documentation

- a) Event Reporting Criteria
- b) Event Screening procedure
- c) Significance Rating Procedure.

2.5.2.3. Self-assessment review topics

- a) Who is involved in the screening process?
- b) What criteria are there for scope of analysis — ignore/return to the department/file/trend/in-depth analysis, etc.?
- c) Are screening thresholds applied consistently?
- d) What process is actually used for everyday analysis, one off in-depth analysis or trending?
- e) Are the events reporting criteria to regulatory authorities, other external authorities, utility representatives and other plants, etc. defined, appropriate and comprehensive?
- f) Are the event reporting criteria correctly applied?
- g) Does reporting comply with the reporting criteria?
- h) Are the significance rating procedures defined, appropriate and comprehensive?
- i) Are the significance rating procedures consistently applied?

2.5.3. Investigation/analysis process

2.5.3.1. Attributes

Investigation and analysis of an event report allows for determination of the causes of an event. From this information, corrective actions can be initiated to equipment, human performance and processes to preclude further occurrence. Attributes of an investigation, analysis process are:

- a) An investigation is performed of the event to gather all relevant information.
- b) Analysis is performed to a depth commensurate with significance of the event. Events with high significance/safety impact utilizes a formal root cause analysis process (ASSET, HPES, etc.).
- c) Similar internal and external events is considered during the analysis process (where possible).
- d) Personnel performing the analysis are trained in the processes used and their proficiency monitored.
- e) The analysis is reviewed by management to ensure concurrence.

2.5.3.2. Documentation

- a) Event analysis procedures
- b) Event analysis reports.

2.5.3.3. Self-assessment Review topics

Review of sample events including industry experience reports (include several safety significant events).

- a) Does the procedure provide adequate guidance for producing analysis reports and supporting documentation?
- b) Adequacy of event analysis process in identifying: “what happened?”, “why did it happen?” and “how will it be prevented from recurring?”
- c) Does analysis consider factors such as initiating event, flawed defences, event precursors, latent organizational weaknesses?
- d) Have the off-site event reporting criteria been correctly applied?
- e) Does an investigation report exist for event reports, at least for those above the minimum threshold defined by the plant?
- f) Is the quality of the event reports sufficient (clear statements, correct description)?
- g) Are suitably trained and experienced personnel involved in the analysis of the event or in the overview of the analysis?
- h) Are personnel who are suitably trained and experienced in the techniques of event investigation and analysis involved in the evaluation of the event or in the overview of the evaluation?
- i) Is sufficient attention given to the investigation and analysis of low level events and near misses?
- j) Are the corrective actions proposed related to the elimination of the root causes?

2.5.4. Trending and trend review

2.5.4.1. Attributes

Trending allows a review to recognize developing, or emergent problems. By recognising developing problems, proactive action may be taken to restore positive trends.

- a) Trending may take any form which a plant/utility finds to be of greatest value. Typically, it should be possible to trend equipment, human performance and process (system or procedures) problems. In order to do this effectively, it may be necessary to adopt coding. This would allow plant/component type, root causes, event/action significance/priority, reporting criteria (threshold) etc. to be recorded and easily sorted.
- b) There is no point in trending if the trends do not receive comprehensive review. It is only by observing trends and applying careful thought and judgement that proactive action may be taken to reverse adverse trends or to enhance/support positive trends.
- c) NPPs need to devise their own trend review system. Typically, this may be based on a periodic site management review meeting. Departmental Managers participate. Significant events, root causes, reactor trips/forced shutdowns, accident rates, fire incidence, defects, leaks, safety related actions etc. may be reviewed.
- d) Trend summaries are reviewed by management and action plans agreed with corrective actions to address adverse trends.

2.5.4.2. Documentation

- a) Trend Criteria
- b) Event analysis reports
- c) Trend Review report.

2.5.4.3. Self-assessment review topics

- a) Is there an effective trending/coding process covering equipment, human performance and procedural and organizational failures?
- b) Who is involved in the trending/coding process?
- c) Are the trend review reports comprehensive?
- d) What reports are made to management on regular basis? How frequently are trend review reports prepared?
- e) How are trend review reports utilized?
- f) What other reports are given to management (e.g. reports requested on specific issues)?
- g) Do recurring events indicate that trending analysis and subsequent corrective actions has not been effective?
- h) How are generic issues identified, evaluated and prioritized?
- i) Is all the experience information available to the plant utilized in the trending process, e.g. low level events, near misses?
- j) What are the significant unresolved safety problems that have been identified — from trending data, field observations and plant performance data what are the key issues? Do deficiencies noted on the plant indicate that the process is not highlighting important issues?
- k) Are Quality Assurance audit findings included in the reviews?
- l) What do management believe are the key safety issues identified by OE process for the NPP?

- m) How extensive is the review in identifying latent weaknesses in event prevention processes e.g. surveillance and corrective action programmes? Are all factors routinely assessed; initiating actions, flawed barriers, error precursors, organizational weaknesses?
- n) Are the results of trend review reports reflected in actions or enhancement programmes specified in the plant Business Plan or its equivalent?

2.5.5. External operating experience review

2.5.5.1. Attributes

The use of external OE allows the NPP to learn from the experience of other NPP and implement corrective actions to preclude similar events from occurring at their NPP.

- a) The OE process provides for the collection of significant external OE for review.
- b) Personnel qualified to determine applicability to the NPP performs the review.
- c) Appropriate corrective actions are initiated to preclude occurrence of a similar event at the NPP.
- d) Information in the form of 'lessons learned' is disseminated to appropriate personnel.
- e) A periodic assessment of the use of external OE is conducted to monitor effectiveness.

2.5.5.2. Documentation

- a) Procedure for screening, dissemination of external OE, analysis and corrective actions setting.
- b) External OE screening meeting minutes.

2.5.5.3 Self-assessment review topics

- a) What sources of external operating experience information are available to the plant?
- b) What criteria are used to consider external events (e.g. same type of plant, human factors, processes — operations, maintenance, tech support etc.).
- c) How experienced is personnel involved in screening external events?
- d) How available is external OE information to personnel?
- e) How often is external OE information incorporated into the internal process?
- f) How effectively is external OE information communicated to relevant groups?
- g) How many external events are considered

2.5.6. Action management process

2.5.6.1. Attributes

The result of the investigation activities (event investigation, trending, external OE, etc.) will be the placement of corrective actions. These actions must be designed to correct root causes and prevent repeat events. Actions should also consider the need to improve management systems and safety culture.

Actions have the following attributes:

- a) they are specific and practical;
- b) their content and timescale are agreed by the recipient of the action (persons accountable and responsible for the action);

- c) they are prioritized and justified — a simple prioritization system is suggested, e.g.:
 - must do within target timescale;
 - should do with target timescale (some flexibility);
 - may do (resource permitting).
- d) Short term action/contingencies to correct significant problems should be implemented awaiting long term corrective action completion. (Immediate actions should be taken to decrease the risk of a subsequent event, even though full corrective actions have not been implemented.)

An action management system includes:

- a) Tracking (a system which allows actions, target dates and those responsible to be recorded). The tracking system is capable of generating reports, status of actions, completed actions, overdue actions, actions by department, section, recipient etc.).
- b) Accountability Review (methods for the management review of in-process/overdue actions such that any difficulty with the timely closing of an action can be resolved).

2.5.6.2. Documentation

- a) Action management process including the determination of responsibilities and agreed timescales
- b) Plant/peer review reports
- c) Accountability process description
- d) Corrective action prioritization description
- e) Statistics of overdue (outstanding) actions to be completed.

2.5.6.3. Self-assessment review topics

- a) What is the corrective action tracking process?
- b) Does the corrective action plan contain priorities and time schedules for each corrective action?
- c) Are the corrective actions integrated into the plant work schedules/plans?
- d) Are responsible staff regularly held accountable for meeting declared targets at formal managerial meetings?
- e) How is progress against the declared plan regularly monitored?
- f) How are all relevant personnel consulted before mid-course corrections are made to plans, schedules, allocated resources?
- g) Have recommendations from previous plant or peer reviews (including process and programme self-assessments) been included in the action management system and completed?
- h) Who is involved in the development of corrective actions? Are they discussed/agreed with persons responsible for implementation? Are they discussed/agreed with persons involved in the event, etc.?
- i) Is management commitment demonstrated? Is there support for the programme and attention to corrective action?
- j) Do business plans or their equivalent reflect the overall issues identified?
- k) How effective have completed actions been in preventing recurrence of events?
- l) Are there any indicators to show effectiveness of the programme? Does this reflect into actual performance?
- m) Are short term corrective action programmes put in place when the proposed comprehensive actions require considerable time to fully implement?

- n) Are corrective actions project managed appropriately? Is the necessary resource/finance/schedule, etc. identified?
- o) What action is taken if corrective actions are not completed by the due date?

2.5.7. Immediate review of events with significant plant impact

2.5.7.1. Attributes

Significant challenges to operations are reviewed and acknowledged prior to changes in plant conditions or restart of an operation to preclude recurrence.

Examples: reactor trip, safety system actuation, fuel handling event.

- a) The review analyses the event and provide corrective actions to preclude recurrence of the event.
- b) Determination is made of time frame for the corrective actions, e.g. prior to re-start or after re-start. This will allow the NPP to correct deficiencies which have immediate effect on safe operation.
- c) Determination of implementation of corrective actions must be based on safety impact to the NPP.
- d) Management ensures that all required actions have been completed prior to re-start of the reactor or re-start of the operation.

2.5.7.2. Documentation

- a) Previous significant plant impact event reports (internal and external) and investigation reports.
- b) Significant plant impact event investigation process description.
- c) Trend analysis report.

2.5.7.3. Self-assessment review topics

- a) Are corrective actions arising from the investigation of the event with significant plant impact been adequate implemented in a timely manner?
- b) Have reviews been completed for all significant plant impact events?
- c) Is there a clear assignment for responsibility for the review?
- d) Are short term measures put in place to compensate for long term actions?

2.5.8. Utilization and dissemination of OE information

2.5.8.1. Attributes

In a learning organization individuals at all levels of the organization use operating experience to resolve current problems and anticipate potential problems. It is important that lessons learned are timely communicated to personnel most likely to be involved in a recurrence of the event/problem.

- a) The use of operating experience information is also reinforced in important plant activities; for example, through pre-job briefings and engineering design reviews.
- b) Relevant internal and external operating experience reports, together with lessons learned are shared with appropriate staff through briefings or specific training sessions, etc.

- c) Operating experience information are easily accessible to plant personnel.
- d) Relevant internal operating experience, together with lessons learned are shared in a timely manner with external organizations.

2.5.8.2. Documentation

- a) Plant transient/abnormality training programme.
- b) Training plans, consideration of operating experience, e.g. simulator programme.
- c) Operating experience communication materials, e.g. team talks, operating experience bulletins (internal and external OE information).
- d) Records of required reading.
- e) OE reports to external organizations.

2.5.8.3. Self-assessment Review topics

- a) Has a system been established to ensure that all required information is disseminated to relevant staff in a timely manner (e.g. directed reading, revision, newsletters, posters)? Are all relevant events included?
- b) How is plant information disseminated off-site?
- c) Are the staff knowledgeable of recent significant events, both internal and external?
- d) Is relevant OE information available to all staff?
- e) How is OE information utilized as input to training programmes?
- f) Are training programmes reviewed regularly, taking into account relevant OE information?
- g) Is previous OE routinely included in pre-job briefings? Is this formal/informal?
- h) Is there a programme for “just-in-time” use of OE?
- i) How is relevant OE information routinely communicated to plant personnel?
- j) Is relevant internal OE communicated to external organizations in a timely manner?

2.6. RESULTS

The purpose of an operational experience programme is to identify and eliminate potential initiators of safety significant events and to prevent recurrence of events. Operating experience provides for a learning and correcting environment. Effective implementation of the OE process can be demonstrated by plant operational and safety performance improvement.

2.6.1. Attributes

The effectiveness of the OE process may be indicated by the evaluation of overall operational results through a set of indicators and by concentrating on their trends. Effective monitoring can be achieved by:

- a) establishing plant performance indicators that are tracked to assess performance.
- b) trending the indicators and determining weaknesses in the OE process that may cause adverse trends and determining the corrective actions required .
- c) periodic self-assessment of the OE process. This assessment should include compliance to the OE process, timelines of corrective actions and effectiveness of corrective actions.

Indicators should describe the effectiveness of the operational experience process and the enhancement of plant performance. Indicators may include:

- number and trend of significant events
- recurrent events
- recurrent root causes
- any unplanned reactor trips
- collective dose
- radiological discharges
- fire incidence
- industrial accidents
- ratio: surveillance/in service deviations
- safety system availability
- equipment reliability
- human error causal factors
- ratio of significant events to low level events and near misses
- fuel damage.

Indicators may vary from plant to plant, but capture items important to the safety performance of the NPP. The results of performance indicator assessment reflects the actual conditions in the plant.

2.6.2. Documentation

- a) List and definition of the Performance indicators utilized by the NPP to monitor the effectiveness of the OE process.
- b) Programmes covered by the overall OE process (QA, Operating Experience Feedback, Industrial Safety, Surveillance Testing, etc.).
- c) Recent reports of the performance indicator results and trends.

2.6.3. Self-assessment review topics

- a) What performance indicators are defined and applied?
- b) How effective are the performance indicators in identifying trends of NPP performance?
Are the trends reflected by the performance indicators demonstrated by actual observations made on the plant, e.g.:
 - what are the major findings, comments and conclusions resulting from plant observations and audits findings (QA, OE, etc.)?
 - what are the findings, comments and conclusions resulting from discussions with plant staff?
 - feedback from plant peer evaluations, inspection reports (internal, regulatory body, etc.).
- c) How effective is the surveillance process in preventing events?
- d) Are all the areas as described on Fig. 3 covered by the OE process and monitored through performance indicators?

2.7. MONITORING OF OE EFFECTIVENESS

For the purposes of these guidelines, operational experience process monitoring is understood as a review of the effectiveness of the OE process of an NPP to enhance operational safety, including all the mechanisms necessary to facilitate continuous improvement of the OE process.

2.7.1. Attributes

The objective of self-assessment is to provide for ongoing OE process optimization. Such ongoing assessment of the effectiveness of an OE process should be carried out regularly (e.g. on an annual basis), by the operational safety performance experience review organization through the monitoring of activities and evaluation of performance indicators. The self-assessment allows those responsible for the OE process to take timely actions to improve activities and organizational interfaces as necessary.

Self-assessment will generate findings and observations. To formalize the assessment, the following elements should be included in the report of the assessment:

- Conclusions
 - is the OE process being implemented effectively?
 - have important issues, including key operational/safety issues been identified?
- Recommendations
- Suggested action plan
- Management agreement.

Conclusions will identify shortfalls in the OE process and its implementation.

Recommendations will suggest areas for improvement in line with gaps identified by the conclusions.

The action plan considers the priority and timescales (preferably with the agreement of the recipient of the action, to ensure ownership). Actions placed are entered into the operational safety process and tracked to completion in the same way as actions arising from events or deviations. Completion of the actions is managed via tracking and accountability review.

The self-assessment report is presented to the management team. The major findings are discussed and the action plan agreed.

2.7.2. Documentation

Previous self-assessment reports (where available).

2.7.3. Self-assessment review topics

- a) Is there a well defined programme for conducting self-assessments?
- b) Is there positive progress in completion of recommendations from previous self-assessment reports?

Do the plant observations and review of management expectations concur with the conclusions of the self-assessment?

3. STRATEGY, LOGISTICS AND ADMINISTRATIVE MATTERS IN THE CONDUCT OF AN IAEA-LED PROSPER MISSION

3.1. PURPOSE OF GUIDANCE IN SECTION 3

The guidance set out below is intended to provide a basic structure and common reference for peer reviews of the effectiveness of the OE processes by IAEA-led PROSPER missions. As such, this guidance is directed at team members of the IAEA PROSPER missions.

PROSPER missions perform a combination of two types of peer review:

- a programmatic review of the overall effectiveness of the operational experience processes for the utility or NPP;
- a review focused on the unresolved significant safety issues or individual events.

A PROSPER mission considers the effectiveness of the OE processes in enhancing operational safety performance. It is based on the review of the plant self-assessment report carried out in conjunction with knowledgeable plant counterparts, together with observations made during plant walkdowns, discussions with plant staff in the field and consideration of relevant plant performance indicators.

3.2. OBJECTIVES OF IAEA-PROSPER MISSIONS

The effectiveness of the operational experience process of an NPP can be assessed by two complementary types of assessment: (a) self-assessment by the plant staff and (b) peer review by the plant owner/operator or independent body. These assessments differ in the independence of the review team, the degree of formality and interval between assessments. The PROSPER mission is an independent peer review, it is not a compliance check; it is intended to provide assistance to enhance the self-assessment.

The common objective of plant self-assessments and peer reviews is to ensure that the operational experience processes is effective as possible in assisting with the maintenance and enhancement of operational safety performance, and hence continued safe operation of the plant. Additionally, each kind of assessment has its own specific objective:

Self-assessment

Optimization of the operational experience process which should lead to continuous improvement. This may be achieved through regular programmed effectiveness reviews. Determination of whether the OE process is being effectively managed, that the stated expectations and standards are being achieved and maintained, and that significant generic issues are being adequately identified and timely rectified. The IAEA-led PROSPER mission utilizes the plant self-assessment as the basis for its evaluation.

If a utility operates more than one NPP, then it may also be appropriate to perform a self-assessment at the corporate level.

Peer review

Determination of whether the existing OE process meets the best internationally accepted practices including the IAEA Safety Standards and identification of areas for future improvement. Determination of whether the operational experience process is being effectively managed, that the stated expectations and standards are being achieved and maintained. That significant generic issues are being adequately identified and timely rectified. Also that an adequate comprehensive operational experience process is in place to enhance the operational safety performance.

IAEA-led PROSPER missions are an international peer review of many facets of all these programmes.

3.3. PROTOCOL

Preparation for a PROSPER mission will be initiated only after the IAEA has been formally approached by a Member State and funding has been established. The scope of the mission is agreed between relevant organizations (e.g. a utility or NPP) and the IAEA at this stage.

The report prepared by an PROSPER mission will be confidential to the Member State visited unless specifically stated otherwise. The decision to implement any recommendations of the report lies entirely with the utility or NPP concerned.

3.4. METHODOLOGY

3.4.1. Preparation

After a request for an PROSPER mission has been received from a Member State and funding has been established, the designated team leader will arrange for:

- the establishment of liaison contacts with the utility or NPP which will host the PROSPER mission,
- necessary preparatory activities, which could include a preparatory meeting, a seminar on suggested self-assessment activities and assistance during the self-assessment; if necessary,
- the recruitment and briefing of team members.

At the same time, the host organization should nominate a counterpart, who will be the primary contact with the PROSPER team during the review.

The preparatory activities will include the consideration of and an agreement on:

- the type of review requested (i.e. oriented on programmatic, significant issue or combined);
- the scope of the review (e.g. comprehensive review; focused on a specific significant issue or issues);
- the composition of the team;
- the work plan;

- the hosting organization preparation for the self-assessment and review, including a list of documentation required during the PROSPER mission (this activity maybe detailed at an IAEA conducted seminar at the NPP);
- preparation of the advanced information package (see Section 3.6);
- logistic support required (see Section 3.7).

3.4.2. Team composition

The team will consist of a leader and assistant team leader, who will always be IAEA staff members, and a number of experts appropriate to the scope and type of review.

The host country or the host organization may propose external experts to serve as team members or observers, although no experts from the host country may serve as team members. The host country or host organization may also propose observers to the team for consideration by the team leader.

The team members will be selected by the team leader, to provide the team with an adequate depth and scope of expertise, both in the management of operational safety and conducting performance reviews. Ideally, the team composition also provides a cross-section of utility and regulatory insight. Consideration is also given to providing a balance of different cultures, together with reactor type experience, across the team. The team leader considers the proposals of the host country or the host organization for team members and observers.

It is expected that the PROSPER team will normally consist of two IAEA staff and four external experts.

3.4.3. PROSPER mission team leader

The team leader is responsible for:

- official liaison with the host country and organization;
- selecting team members;
- planning and co-ordinating the mission;
- participating in the entry and exit meetings;
- supervising the review, by daily meetings; by ensuring that the mission work plan is met; by informing representatives of the host organization of the results and progress of the review and by resolving any issues requiring decision;
- reviewing and advising on the effectiveness of the team's conclusions.

3.4.4. PROSPER mission assistant team leader

The assistant team leader is responsible for:

- co-ordinating the preparation of, and producing the PROSPER mission report;
- assisting the team leader in all activities of the review.

The team leader or the assistant team leader may participate in some of the detailed areas of the review.

3.4.5. The review

The review team uses three methods to acquire the information needed to develop recommendations. These are:

- review of the self-assessment report, associated documents and written material;
- interviews with personnel;
- direct observation of the physical condition of the NPP and organization, practices and activities associated with the OE process.

Team members are expected to cover relevant material to the extent necessary to make an informed judgement. Differences from IAEA Safety Standards and international practices which are identified are investigated to document any concerns accurately in the PROSPER report and in sufficient detail to be readily understandable. Recommendations and suggestions are formulated on the basis of weaknesses identified. Similarly, good practices encountered in the review are documented for the benefit of other utilities and described in the report in sufficient detail to be readily understandable.

3.4.5.1. Documents

The basis of the PROSPER mission will consist of team members' reviews of the plant self-assessment report, relevant regulatory documents, plant policies and procedures, including Operating Experience Feedback procedures, quality assurance programme and procedures, surveillance and inspection procedures, etc. and results achieved. These will be assessed against guidance contained in relevant international and national guidelines, including the IAEA Safety Standards.

In the comprehensive process review, documentation covering the following aspects of the management of the operational experience processes is reviewed; together with the self-assessment report:

- (a) Associated documents produced by the regulatory body.
- (b) NPP policies and procedures relating to the OE processes:
 - operational experience feedback;
 - surveillance and inspection;
 - quality assurance;
 - work scheduling and control;
 - performance indicators;
 - business management, including modification and safety enhancement plans;
 - operational safety management;
 - industrial safety policy.
- (c) The NPP's OE process documents such as:
 - policy on use of operational experience information;
 - organizational arrangements for management of operational experience processes, including assignment of responsibilities;
 - process co-ordination;
 - resource allocation and qualification of personnel;
 - event, deviation, non-conformance, etc. report collection and record keeping procedures.

- (d) Documents on the scope of the operational experience processes including:
- reporting procedure;
 - reporting criteria;
 - screening methodology;
 - investigation techniques;
 - special investigations;
 - assessment methodologies;
 - development of corrective actions;
 - assignment of corrective actions;
 - routine reports;
 - performance indicators;
 - trending.
 - prioritization of corrective actions;
 - accountability for implementation of corrective actions.
- (e) Documents on process quality to determine:
- the effectiveness of established processes for detection, assessment and correction of problems in enhancing the prevention of operational failures.
- (f) Records of results achieved, including:
- business plan or its equivalent;
 - physical condition of the plant;
 - quality of observed work practices;
 - relevant plant safety performance indicators;
 - performance trend records, for equipment, procedures and personnel, including failure trend data;
 - repeat events.

In a review focused on a specific problem or issues, all relevant documents and information should be reviewed, such as:

- significant event reports;
- operating and maintenance history as agreed with plant (for example 3 years);
- generic operating experience.

3.4.5.2. Discussions with plant counterparts and interviews with plant personnel

Discussions with plant counterparts can be used to:

- obtain additional information not covered in the documentation;
- clarify issues arising from the documentation review;
- determine whether administrative arrangements and technical programme elements meet established international guidelines and consensus;

The discussions also provide an opportunity for important information to be exchanged between reviewers and counterparts. Discussions should be “give and take”; not interrogation of counterparts by reviewers. Properly conducted, such discussions form a critical part of the overall review.

Interviews with plant personnel can be used to:

- form a judgement on the effectiveness of the arrangements, duties and responsibilities of the plant's functioning OE organization;
- elicit individual opinions.

An introductory meeting during which an overview of the plant operational experience programmes is given and advanced reference materials are discussed should be considered one of the interviews.

3.4.5.3. Observations

Direct observations of the activities carried out within an operational experience process are an important aspect of the review process. The observations should, in general, cover:

- use of procedures and instructions;
- specific reporting requirements;
- quality assurance and quality control programmes and methods;
- use of documentation;
- collection, storage and retrieval of data;
- implementation of surveillance; inspection and testing programmes (equipment, procedures, personnel);
- arrangements for reporting and feedback;
- action management progress;
- potential problem areas not previously recognized by the plant;
- management commitment;
- physical condition of the NPP;
- dissemination and utilization of OE information.

From these observations, the PROSPER team will form a view of:

- the management policy on and commitment to a systematic OE process;
- the commitment of the staff;
- the capability of the staff in terms of resources and technical knowledge and skills;
- the physical condition and functional capability of the equipment;
- procedure use and adequacy;
- organizational and individual safety culture with respect to learning lessons from experience;
- the effectiveness of vertical and lateral lines of communication;
- the traceability of data;
- record keeping and trend monitoring;
- trending activities leading to the identification of unresolved significant safety issues;
- the development of corrective action plans and their inclusion into the plant overall business plan.

On the basis of the discussions, interviews and observations, the PROSPER can then, if appropriate, modify the preliminary views, which are based on the review of the self-assessment, OE documents and past results and performance, to form an opinion on the effectiveness of the process.

3.4.6. Reporting

The PROSPER mission compares observed practices with existing national and international consensus guidelines, including IAEA Safety Standards and equivalent good practices elsewhere. The review should:

- identify programmatic strengths and areas for improvements;
- provide advice on specific problem areas;
- make comparisons and offer proposals for improvement; and
- consider how effectively NPP policies, programmes and procedures are implemented in practice.

The comparisons may result in recommendations or suggestions or the identification of good practices in accordance with the following definitions:

Recommendation: a recommendation is advice on how improvements in the OE process can be made in areas that have been reviewed. Such advice is based on proven international practices and addresses the root causes rather than the symptoms of concerns raised. A recommendation can be for an improvement in management or programmatic aspects of the overall process or in dealing with a specific problem. A recommendation is specific, realistic and designed to result in tangible improvements.

Suggestion: a suggestion is either an additional proposal in conjunction with a recommendation, or may stand on its own. It may indirectly contribute to improvements in the process, but it is primarily intended to make the process performance more effective, to indicate enhancements to existing practices and to point out superior alternatives to current practices. In general, it strongly encourages the plant management and staff to consider ways of enhancing performance.

Good practice: A good practice is an indication of an outstanding organization, arrangement, process or performance, superior to those observed elsewhere, and more than just the fulfilment of current requirements and expectations. It must be superior enough to be worth bringing to the attention of other nuclear plant operators as a model in the general drive for excellence.

Each working day of the mission, the team leader will hold a brief co-ordination meeting where each team member should summarize findings for the day, including perceived strengths and weaknesses in order to allow all the team members to contribute to the overall consolidation of views.

3.4.6.1. Report writing

During the course of the review, after each daily co-ordination team meeting, team members will write detailed sections of the report based on their observations and conclusions, including any recommendations, suggestions or good practices. These also form the basis of oral presentations at the exit meeting. One or more copies of the report are given to plant management prior to the exit meeting.

3.4.6.2. The review team report

On completion of the review, the team and assistant team leaders will prepare the complete team report on the basis of the individual detailed sections. This is the official team document that summarizes the team's main findings and conclusions from comparisons with the IAEA

safety Standards, proven international practices, including all recommendations, suggestions and good practices. Before the text is finalized the management of the NPP whose operational experience processes have been reviewed will be given the opportunity to comment. The final report will be submitted through official channels to the Member State and utility headquarters concerned. The IAEA will restrict distribution to the utility concerned, the contributors to the report and responsible IAEA staff. Further distribution is at the discretion of the Member State or utility concerned.

3.4.7. Duration

The duration of the PROSPER mission will be based on the type and scope of the review and agreed between the management of the NPP being assessed and the team leader during the preparation phase described in Section 3.4.1. As a minimum, the schedule will accommodate the PROSPER mission activities of the indicated participants, as shown in Table II. It is expected that the PROSPER mission will be conducted over eight working days.

TABLE II. PROSPER MISSION ACTIVITIES

PROSPER Mission activities	Team leader and assistant TL	Team members	Plant management	Plant counterparts	Plant personnel
Self-assessment seminar	X		X	X	X
Self-assessment assistance (if requested)	X	X		X	X
Introductory meeting	X	X	X	X	X
Team co-ordination meetings	X	X			
Documentation reviews		X		X	X
Interviews with counterparts		X		X	
Interviews with plant staff		X		X	X
Plant walkdowns	X	X		X	
Direct observations of process activities	X	X		X	X
Compilation of report sections		X			
Preparation of team report including documentation of recommendations, suggestions and good practices	X	X			
Reporting to plant management, including exit meeting	X	X	X	X	X

3.5. ADVANCE INFORMATION PACKAGE

To facilitate the OE review within the limited time available, PROSPER members must be informed in advance of the review about the regulatory environment, NPP description and organization, and in particular, about the organization of the OE processes, including its operations, maintenance and technical support arrangements and practices relating to the management of OE processes. They must also receive the plant self-assessment report of the OE process for initial review. In the case of a PROSPER mission focused on a specific issue or issues, additional relevant information should be provided. The suggested contents of the advanced information package are:

- (a) plant self-assessment report of the effectiveness of the operational experience process
- (b) regulatory environment:
 - overview of regulations on nuclear safety and radiation protection;
 - regulatory requirements on event reporting.
- (c) general plant information: (approximately 10 pages of written material plus charts and illustrations):
 - utility and NPP organization charts;
 - site and NPP design description;
 - operating history, current status and future plans;
 - outline of event reporting procedures;
 - reporting criteria to regulatory body, utility and in-house;
 - outline of the NPP's operational experience process,
 - outline of programmes associated with failure prevention such as: surveillance and inspection programmes; corrective and preventive maintenance programmes; document amendment programme; human performance enhancement programmes; training and qualification programme; refresher training programme; etc.
- (d) OE information:
 - policy and procedures on use of operational experience;
 - organization of the operational experience processes, participating organizations and their interfaces, responsibilities, structure and staffing;
 - documented methodology for event investigation, analysis and trending;
 - outline of action management programme including outline of prioritization, tracking and accountability processes;
 - recent significant event reports;
 - complete list of all reported events during the review period under consideration.
- (e) For a specific issue or problem:
 - problem description; reports; etc.
 - description of advice sought.

The advanced information package should provide, in English, an overview (not details) of the listed topics, and is prepared, to the extent possible, using existing documentation. It is desirable that the package be delivered to the IAEA at least two months before the mission so that PROSPER members receive it at least one month before the start of the mission.

3.6. SUPPORT ARRANGEMENTS

As part of the preparation for the PROSPER mission, arrangements have to be made with the NPP involved for the provision of the necessary support and facilities, including translation and interpretation, as appropriate.

To the extent possible, the documents identified under Section 3.4.5.1 are provided in English as it would facilitate the review by the PROSPER mission. However, it is recognized that their translation can be cost prohibitive, and therefore alternative arrangements can be made for their review, e.g. through NPP personnel competent in English.

At all times, there should be at least one meeting room of suitable size and privacy at the disposal of the PROSPER mission. Also two small meeting rooms should be available for discussions and self-assessment report review with plant counterparts. Additionally, secretarial services, including typing and copying facilities, are made available by the NPP throughout the review.

3.7. FOLLOW-UP

The follow-up of findings and recommendations for further improvement resulting from the review of the operational experience processes depends on the type of assessment that has been performed.

Plant follow-up of self-assessment

The findings of the self-assessment of the OE processes normally result in timely actions to improve operational safety performance as part of a continuous improvement process. This improvement is verified through normal management accountability meetings and as part of the subsequent self-assessment.

Peer review follow-up

The findings of the PROSPER mission are formally reported to the utility management along with the corrective actions agreed by the NPP. It is suggested that, at the request of the operating organization or Member State, an IAEA-led follow-up mission is conducted within 18 months of a full PROSPER mission. The IAEA-led PROSPER Follow-up mission will review the progress achieved by the plant in carrying out the agreed recommendations made by the mission and also in correcting the deficiencies identified through the self-assessment. This evaluation will determine the effectiveness of those actions in improving the OE processes. The follow up team will consist of an IAEA Team Leader together with two international experts. The duration of the follow-up mission will be five days.

4. GUIDELINES FOR THE TEAM EXPERTS TO CONDUCT A PROSPER MISSION

4.1. PURPOSE OF GUIDANCE IN SECTION 4

The guidance set out below is directed at members of an IAEA-led PROSPER mission team to determine whether the OE process of the plant under review meets best international practices and to identify possible areas of improvement in preventing operational failures. Additionally, this guidance is intended to assist the PROSPER experts to prepare for and conduct their review in the light of the IAEA Safety Standards and their own experience and knowledge. It outlines the contents and process of an adequate review and should not limit the expert's investigations.

The PROSPER mission conducts the peer review of the plant's self-assessment of the OE process, combined with plant walkdowns, field observations and discussions with relevant plant personnel.

The peer review addresses:

- the thoroughness and accuracy of the plant self-assessment (has it addressed all the potential operational safety issues?)
- the effectiveness of the plant provisions to prevent events (equipment/operability, personnel proficiency and procedure adequacy)
- the effectiveness of plant processes to identify precursors to operational events and hence prevent failures (quality control, preventive maintenance/refresh training/procedural review programmes, surveillance, etc.)
- the effectiveness of the feedback process in preventing further recurrence of failures (root cause analysis, action management programmes)
- a measure of the effectiveness of management's utilization of the OE process to detect, analyse and correct failures (detection, analysis, correction)

The following questions, while not exhaustive, are intended to give guidance to the peer review in determining the effectiveness of the plant's process.

4.2. STRATEGY

1. Comment on the overall "use of operational performance information" strategy of the plant — is there a clear published management expectation committing the operator to enhancing the prevention of operational failures through the use of operating experience information?
2. Are regular effectiveness reviews specified and accountability meetings required?
3. Have IAEA, international and national guidance/requirements been taken into account in developing the plant strategy?
4. Does the scope of the OE process include the reporting of low-level and near miss events?
5. Does the scope of the OE process include the requirement to trend and review generic issues to determine unresolved safety issues. Do reviews include operational data other than plant event/deviation reports (e.g. Quality Assurance non-conformance's, plant operational performance data, task risk analysis results, external event reports)?

4.3. ORGANIZATION

1. Are management expectations of personnel specified with regard to reporting abnormalities? Are the roles and responsibilities of personnel involved in processing operational safety performance data adequately specified? Are the roles and responsibilities of personnel responsible for event investigation, analysis, corrective action development and implementation adequately specified?
2. Are the OE processes adequately specified and are expectations clearly understood by plant personnel?
3. Are specialist staff, other than dedicated OE review personnel, involved in the analysis of operating experience information and the development of corrective actions?
4. Are adequate resources devoted to the OE processes (equipment, personnel, finance)?
5. Are there effective channel of communication with external sources of OE information?

4.4. ACTIVITIES

4.4.1. Event/deviation reporting and tracking

1. Is event and deviation reporting comprehensive. Is minor, low level and near miss reporting actively encouraged? Is there a declared policy of no-blame reporting — what is the staff perception — is it considered punitive?
2. Is reporting of deviations, events, precursors, etc. carried out by all the different levels of personnel, sections, departments, etc. throughout the plant organization? Do all staff contribute?
3. Is the reporting process user friendly? Are the relevant plant personnel fully aware of the process?
4. How accessible is the event report information to plant personnel?
5. Are the reporting requirements communicated to plant personnel during initial and refresher training? What other methods are used to convey management's expectations on reporting?
6. Are reports tracked to ensure analysis is complete and corrective action taken etc.?
7. Is there a tendency in reporting either equipment, procedural or personnel deficiencies?
8. Is there physical evidence in the plant of unreported deficiencies, event precursors or error likely situations (e.g. defective equipment, poor material condition, poor or unsafe working practices, un-controlled operator aids, lack of document control, etc.)?
9. How comprehensive is event reporting and is information centralized?
10. Are deviations identified by relevant review programmes (e.g. QA, surveillance testing, management tours. etc.)?

4.4.2. Screening of reports for significance

1. Are criteria for in-depth investigation and root cause analyse established? Are there clear responsibilities for this decision making?
2. Is timely screening for reporting purposes or assessment of effect on plant evident? Is there evidence of dissatisfaction from receivers (e.g. regulatory bodies and other off-site authorities, utility, international organizations, etc.) regarding timeliness of reporting? Is there a backlog of events to be analysed — if so, how significant are they?
3. Is there a threshold for exclusion of events? If so, is that threshold appropriate?
4. Are the plant reporting criteria adequately defined and are they comprehensive?

5. Comment on the comprehensiveness of the criteria for reporting to the regulatory body — do they cover all safety significant events?
6. Comment on the comprehensiveness of the criteria for reporting to other external bodies (Health and Safety, Environmental, etc.) — are all relevant deviations covered?
7. Are all reported safety relevant deviations currently identified and analysed to learn the lessons — does the plant comply with its criteria?
8. When reporting criteria are met is the action to be taken specified in writing?
9. Is there a requirement to timely assess the effect of the plant deviation on plant operations?
10. Is there evidence of prompt decision and action following events with significant plant impact (e.g. reactor trips)?
11. Is the investigation/analysis method utilized appropriate to the significance of the event?

4.4.3. Investigation/analysis process

1. Do the plant have sufficient suitably trained and experienced investigators/analysts to adequately process the event information?
2. Are the methods utilized adequately defined and regularly used (e.g. HPES, ASSET, etc.)?
3. Are the methods utilized adequate to identify direct and root causes, together with contributory factors? Do the methods used address equipment, procedural and personnel issues adequately? Are failed barriers, organizational weaknesses and error likely situations considered? Does the investigation confine itself to the causes of the event or are other weaknesses identified by the analysis, that may have had no direct relevance to the actual event, also acted upon?
4. Are investigations conducted in a timely manner?
5. Are adverse trends considered during an event investigation? Is effectiveness of corrective actions taken to previous similar events considered during an event investigation?
6. Are similar internal or external events considered during the investigation/analysis process?
7. Do investigation reports exist for all safety relevant deviations — comment on the quality of the information available in the analysis reports? Are all the direct and root causes identified, together with contributory factors? Are the corrective actions proposed clearly related to resolution of the causes? Review and comment on a selection of representative event reports for adequacy and completeness.
8. Is there a process to review the quality of the investigation/analysis report?

Note:

Sample events representative of each of the unresolved safety issues will be reviewed by the IAEA team utilising if possible methodology different from the plant (e.g. ASSET, HPES) to allow an assessment to be made of the plant capabilities of identifying, analysing and correcting the direct and root causes of the event, and any contributing factors. Additional recommendations resulting from the analysis that may further enhance the plant safety performance will be made.

However, each methodology has its own limitation and it may not be suitable to apply the approach highlighted above to all identified safety issues. Different approaches based on expert experience/knowledge may also be used to comment on the comprehensiveness of the plant analysis.

4.4.4. Trending and trend review

1. Are events “categorized/coded” in any way and trended (e.g. plant code, equipment, personnel, procedures, management process, direct causes, root causes, significance, reporting criteria met, etc.)?
2. Is the trending system utilized comprehensive in specification (equipment, personnel, and processes, etc.)? Are the criteria for categorization/coding specified adequate for trending purposes? Is the application of consistent categorization/coding apparent?
3. Is the system capable of allowing user friendly/flexible searches on trends to be conducted?
4. Are regular trend reviews carried out? Are reports prepared and summaries issued? Are they relatively timely and relevant?
5. Are adverse trends reviewed and corrective actions taken.
6. Is there a routine management review/significance review carried out and are actions taken on the results of the reviews. Is this evident in the action plans of the plant
7. How are the key issues identified? Comment on the key safety issues — are equipment, procedural and personnel issues identified. Comment on their ratios.
8. What are the unresolved key safety issues identified by the trending process? Comment on their significance to safety (consequences, causes, production). Comment on the priority given to corrective action by the plant.
9. Do these unresolved safety issues show a weakness in; the ability to identify issues before they result in failures/events, the ability to adequately and comprehensively analyse the identified issues; or a failure to implement appropriate and comprehensive corrective measures in a timely manner? Is the ability to identify, analyse or correct issues trended over the years?
10. Is the significance to safety of the consequences of the events trended over the years? Should positive or adverse trends be commented upon?

4.4.5. External operating experience review

1. Are external OE reports screened adequately? Is too little (or too much) information introduced into the plant OE process? Are the personnel responsible for screening suitably experienced? Do they have adequate resources to conduct their duties?
2. How do the staff determine whether the external operational experience report is relevant to the plant? Are relevant external OE reports adequately assessed and timely circulated for information?
3. Where necessary are appropriate actions from external events placed and tracked?

4.4.6. Action management programme

1. Are the corrective actions proposed specific, measurable, achievable, realistic and can they be implemented in a timely manner? Are they positively stated, understood, relevant and comprehensive?
2. Are short term corrective action programmes put in place when the proposed comprehensive actions require considerable time to fully implement?
3. Are corrective actions systematically prioritized to specific criteria? Do these criteria consider relevance to safety? Is risk analysis carried out when considering prioritization? How is the prioritization of actions decided? What criteria are considered?

4. Is the appropriate level of management held accountable for completion of the corrective actions?
5. Are regular accountability meetings held with responsible personnel and progress against targets reviewed? Are the meetings effective in achieving progress against targets? Comment on number of outstanding corrective actions and number of overdue actions — are they concentrated on one department — of a certain nature (equipment, personnel, procedures).
6. Have previous corrective actions been effective in eliminating the direct, root causes and contributors to events (e.g. initiating events, flawed defences, event likely situations and organizational weaknesses)? A review on the plant of selected fully implemented corrective actions should be conducted.
7. Have any issues been closed prior to the completion of a corrective action? Have any issues been considered closed following the development of a plan to implement corrective action, rather than following full implementation of corrective action?
8. What is the process for agreeing corrective actions and the timescales for completion — are persons responsible for implementation involved in the development of the actions and the corrective action programme?
9. Is an effective system for tracking the progress of outstanding actions in place?

4.4.7. Immediate reviews of events with significant plant impact

1. Are immediate reviews of events with significant plant impact carried out in a timely manner (e.g. reactor trips, safety system actuation, fuel handling events, etc.)?
2. Are corrective actions resulting from immediate reviews of events with significant plant impact implemented in a timely manner? Have deficiencies which have an immediate effect on safe operation been considered and rectified prior to continued operation?
3. Have the lessons learned been timely disseminated by pre-operation briefings, directed reading programmes, etc.?

4.4.8. Utilization and dissemination of operational experience information

1. Are plant personnel knowledgeable of recent relevant significant events, both internal and external?
2. Is relevant OE information readily available to all concerned plant personnel. Comment on the effectiveness of the dissemination of the information — is the information apparent in the plant — OE bulletins, notices, etc. Is “just-in-time” OE utilized?
3. Is there regular plant information exchange on abnormal events for plant personnel where relevant event information is presented and discussed?
4. Are lessons learned from recent external and internal events included in refresher training (e.g. simulator training)? Are other disciplines included other than operations (e.g. maintenance)?
5. How are lessons learned from previous events disseminated and used in pre-job briefings? Is the information provided in a timely manner and “just-in-time”?
6. Are regular staff briefings on safety issues and lessons learned carried out by management/supervisory staff. How effective are these briefings in enhancing the performance of personnel

7. Do the criteria for reporting to external organizations (regulatory authorities, utility and international organizations, etc.) comply with the requirements of external organizations in ensuring learning opportunities are maximized?
8. Is off-site reporting adequate? Are there events that should have been reported off-site that were not? Have events been reported off site that were not appropriate?.

4.5. RESULTS

1. Do the results of routine managerial plant walkdowns reflect the deviations/events/issues reported by plant personnel into the OE process? Do the results of the Mission plant walkdown reflect the results of recent managerial walkdowns?
2. Are the deviations/events/issues etc. reported by plant personnel reflected in QA non-conformance reports?
3. Is the plant pro-active or re-active in its failure prevention programme? Is the plant able to determine how many events are detected through surveillance programmes (prior to being put into service, by preventive maintenance or surveillance) versus operational failures? How many deviations are reported as a result of quality verification prior to service, measures taken to prevent deterioration in service or surveillance programmes to detect unforeseen degradation in service?
4. What performance indicators are utilized by the plant to determine the effectiveness of the OE process? Are these indicators plant specific or only those required for reporting to external organizations?
5. Do the performance indicators show an improving or deteriorating situation? How have the performance indicators been utilized in focusing attention on the need to take action to improve? Has it been possible to determine declining situations from specific indicators before performance has been affected? What examples are there to demonstrate this?
6. Are the operational performance indicators compared to those of similar plants (e.g. WANO indicators) Have any initiatives been developed following comparison with other plants? How have these initiatives been developed?

4.6. MONITORING OF EFFECTIVENESS

1. Is a self-assessment of the effectiveness of the OE process conducted on a routine basis? If not how does the plant determine the effectiveness of its programmes in enhancing the prevention of operational failures?
2. Is the overall timeliness of OE process in responding to events regularly reviewed?
3. Is the overall timeliness of corrective actions progress regularly reviewed?
4. Is the overall quality of analysis and adequacy of developed corrective actions regularly reviewed? Is effectiveness of the corrective actions validated?
5. Is regular consideration given to the applicability and adequacy of the performance indicators?
6. Have the recommendations from previous self-assessments and reviews been acted upon and has improvement been attained?
7. Are repeat events and the need for repeat corrective actions occurring?
8. Has the self-assessment been performed by personnel with sufficient authority to initiate changes to the process?

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