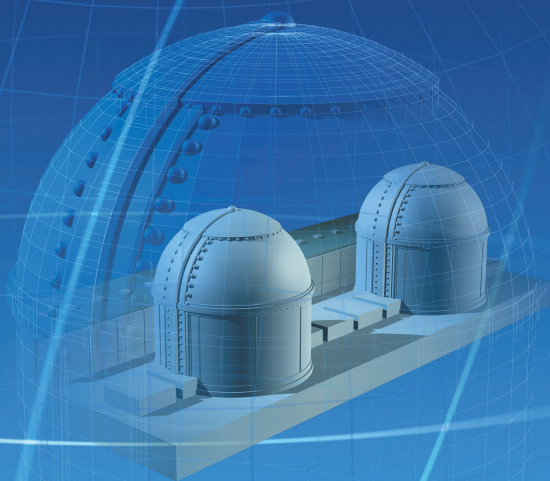


OSART

Operational Safety Review Teams



IAEA

International Atomic Energy Agency

OSART

Operational Safety Review Teams



IAEA

International Atomic Energy Agency



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FOREWORD

The best known of the IAEA's safety review services is the Operational Safety Review Team (OSART) programme. Established in 1982, the OSART programme has provided advice and assistance to Member States for 30 years, to enhance the safety of nuclear power plants during construction, commissioning and operation.

It has also been greatly valued for providing the opportunity for mutual learning and sharing of knowledge and experience — such as good practices and lessons learned — among team members, who are drawn from different Member States and host plant personnel.

Nuclear safety is one of the three pillars of the IAEA's activities. The IAEA safety standards and their application have played a central role in enhancing nuclear safety in Member States.

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

The strategic approach to enhancing such a framework aims at ensuring that the overall safety level in Member States continues to improve. This approach involves four elements:

- Improvement of national and international safety infrastructure;

- Establishment and global application of the IAEA safety standards;
- Use of an integrated approach to the application of safety standards;
- Establishment of a global network of knowledge and experience.

The OSART programme is the main approach to providing for better and wider application of the IAEA safety standards. The primary function of the OSART programme is to assess the operational safety activities of, and provide advice to, the host plant on the basis of the IAEA safety standards and to introduce the OSART methodology for the host plant to establish or improve its own self-assessment programme.

The OSART programme broadly covers the following ten operational areas as standard review areas: management, organization and administration; training and qualification; operations; maintenance; technical support; operating experience; radiation protection; chemistry; emergency planning and preparedness; and severe accident management. Recent enhancements of the OSART programme are the addition of severe accident management to the standard review areas and the establishment of four optional review areas: long term operation; probabilistic safety analysis (PSA) applications; transition from operation to decommissioning; and safety culture.

Practical experience in the application of the IAEA safety standards in Member States is fed back into the IAEA's process, to establish or to improve the safety standards.

The OSART programme has been a cornerstone of the IAEA's efforts to improve the safety of nuclear installations worldwide. Moreover, it has made great contributions to the IAEA safety standards programme and to assisting Member States in developing and improving their own self-assessment programmes, as

well as to the enhancement of the worldwide safety level in Member States.

The importance of the OSART programme has been emphasized in General Conference resolutions and at the review meetings of the Convention on Nuclear Safety. In the IAEA Action Plan on Nuclear Safety, elaborated in the light of lessons learned from the accident at the Fukushima Daiichi nuclear power plant and unanimously endorsed by all Member States during the IAEA General Conference held in 2011, the importance of the OSART programme is emphasized and Member States are strongly encouraged to host OSART missions on a regular basis.

It is desirable that the objectives and significance of the OSART programme be well understood globally and that all Member States be encouraged to fully embrace shared ownership for the further development and success of such an important safety service.

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WHAT IS AN OSART MISSION?

Summary

Since its formation, the IAEA has conducted missions to facilitate the provision to Member States of advice and assistance concerning nuclear safety matters. Until the early 1980s, industry safety activities focused mostly on plant design and construction. Thereafter, as more plants were completed and began operation, the industry recognized the growing importance of achieving high standards of operational safety and reliability. In addition, it began to realize the benefits of achieving a level of safety higher than the minimum standards set by regulatory authorities for the protection of the public and the environment. The efforts needed to achieve high levels of operational safety, such as careful planning, conservative decision making and attention to detail, also contribute directly to enhancing plant reliability and productivity.

In 1982, the IAEA added the Operational Safety Review Team (OSART) programme to its services. Under this programme, international teams of experts conduct in-depth three-week reviews of operational safety performance at individual nuclear power plants. These reviews are conducted at the request of the government of the host country.

The OSART programme provides an opportunity for nuclear power plant operators in all countries to assist other operators through the dissemination of information on best international practices. Each OSART mission is conducted by a team of experts drawn from all regions of the world. Each of these experts has extensive experience in nuclear power plant operation, and cumulative nuclear experience in a team often exceeds 300 years. The guidelines used to review plant performance and programmes are based on the IAEA safety standards.

OSART missions focus on the safety and reliability of plant operation. They review the operation of the plant and the performance of the plant's management and staff. Factors affecting the management of safety and the performance of personnel — such as organizational structure, roles and responsibilities, management goals, and the qualification of personnel — are reviewed. Safety culture in the plant is also reviewed as an integral part of each review area and is summarized in the management, organization and administration review area.

In the course of detailed discussions with plant personnel, the review of documents and the observation of plant activities, the team identifies good practices that can be shared with others and areas where improvements can be achieved.

The first OSART mission was conducted at the Ko-Ri nuclear power plant in the Republic of Korea in August 1983. As of April 2012, a total of 167 missions had been carried out at 102 nuclear power plants in 33 countries (see Table 1). In addition, 108 follow-up visits have been conducted since 1989, when such visits became a standard feature of the OSART programme. The results of follow-up visits are used to measure the objectives of each mission and ultimately the outcome of the OSART mission — improvements in operational safety.

Purpose and objectives

The purpose of the OSART programme is to assist Member States in enhancing the operational safety of specific nuclear power plants and to promote the continuous development of operational safety within all Member States through the dissemination of information on IAEA safety standards and good practices.



In support of its purpose, the key objectives of the OSART programme are:

- To provide the host country (plant and utility management, the regulatory authority and other governmental authorities) with an objective assessment of operational safety at the host plant with respect to IAEA safety standards;
- To provide the host plant with written recommendations and suggestions in those areas needing improvement to meet IAEA safety standards, and to identify good practices worthy of being brought to the attention of others;
- To provide key staff at the host plant with informal assistance or advice on how improvements might be achieved;
- To provide experts and observers from Member States and IAEA staff with opportunities to broaden their experience and knowledge of their own field, and to learn the OSART methodology for operational safety, which will enhance their management skills.

OSART missions promote the global application and acceptance of the IAEA safety standards. They are peer reviews conducted by international teams of experts

Table 1. OSART Missions from 1983 to May 2012

Member State	Type of mission ^a	No. of missions	No. of follow-up visits	Year of mission
Armenia	O	1	—	2011
Argentina	O	1	1	1997
Belgium	O	2	2	2007, 2010
Brazil	O, T	6	3	1985, 1989, 1992, 2002, 2003, 2005, 2011
Bulgaria	O, P, S, E	6	4	1990, 1990, 1991, 1991, 1995, 1999
Canada	O, T	3	—	1987, 1990, 2004
China	O, P, T	11	8	1989, 1990, 1991, 1993, 1996, 1997, 2001, 2004, 2005, 2009, 2012
Czech Republic	O, P, T, E	9	4	1989, 1990, 1991, 19 95, 1996, 2000, 2001, 2011
Finland	O	2	—	1986, 1990
France	O	23	18	1985, 1988, 1992, 1992, 1993, 1994, 1995, 1996, 1998, 1998, 1999, 2000, 2002, 2003, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011
Germany	O	6	3	1986, 1987, 1987, 1991, 2004, 2007
Hungary	O, P	2	1	1988, 2001
Italy	O, P	2	1	1987, 1988
Japan	O	5	4	1988, 1992, 1995, 2004, 2009
Kazakhstan	O	1	—	1998
Korea, Republic of	O	6	3	1983, 1986, 1989, 1994, 1997, 2007

Lithuania	O	2	2	1995, 2006
Mexico	O, P	4	1	1986, 1987, 1987, 1997
Netherlands	O	3	2	1986, 1987, 2005
Pakistan	O, P, T	5	—	1985, 1989, 1996, 1999, 2004
Philippines	P	2	—	1984, 1985
Poland	P	1	—	1989
Romania	O, P	3	3	1990, 1993, 2005
Russian Federation	P, S	7	5	1989, 1991, 1991, 1993, 2005, 2008, 2011
Slovakia	O, P, S, T	6	4	1990, 1991, 1993, 1996, 1997, 2006, 2010
Slovenia	O	3	3	1984, 1993, 2003
South Africa	O, T	4	1	1989, 1989, 1991, 2011
Spain	O	5	4	1987, 1990, 1998, 2002, 2009
Sweden	O	7	7	1986, 1988, 1989, 1991, 2008, 2009, 2010
Switzerland	O	4	4	1994, 1995, 1999, 2000
Ukraine	O, S, T, E	14	9	1988, 1994, 1994, 1995, 1995, 1995, 1996, 2003, 2004, 2006, 2007, 2008, 2009
United Kingdom	O, P	3	3	1989, 1992, 1994
United States of America	O	7	4	1987, 1989, 1992, 2000, 2005, 2008, 2011

^a O — operational safety review mission; P — pre-operational safety review mission; S — safety review mission (design and operations);

T — technical exchange mission; E — expert mission to former Soviet type reactors.

who have current knowledge of the area that they are reviewing. OSART reviews use a set of guidelines, developed by the IAEA and derived from IAEA safety standards, to assess performance through an exchange of technical experience and practices at all levels (see Fig. 1). Working together, team members and designated plant personnel (counterparts) identify good practices and opportunities for improvement in a plant's programmes, processes and performance. Judgements of performance are based on the IAEA safety standards and the combined expertise of the team. The review teams do not attempt to assess the plant's adherence to regulatory requirements or the plant's overall safety. Nor do they attempt to compare or rank the overall safety performance of nuclear power plants. Each mission starts with the expectation that the plant meets the safety requirements of the host country.

Mission types and relevant services

The OSART programme has developed over a 30 year period and now involves a series of missions. The process begins with a preparatory meeting and a seminar on field inspection techniques one year before the mission. This is followed by the OSART mission itself and then by a follow-up visit, normally about 18 months later.

Various types of mission are available within the OSART programme. The scope and depth of each mission are decided during the preparatory meeting and can be tailored to the desires of the host country and the needs of the plant. The most common missions are 'full scope' coverage of all the areas applicable to the mission type, as outlined below.

Review teams also specifically review the safety culture at each plant visited. Safety culture is defined as that assembly of characteristics and attitudes in organizations and individuals which establishes that, as an overriding priority, nuclear plant safety issues receive the attention warranted by their significance. At the conclusion of each

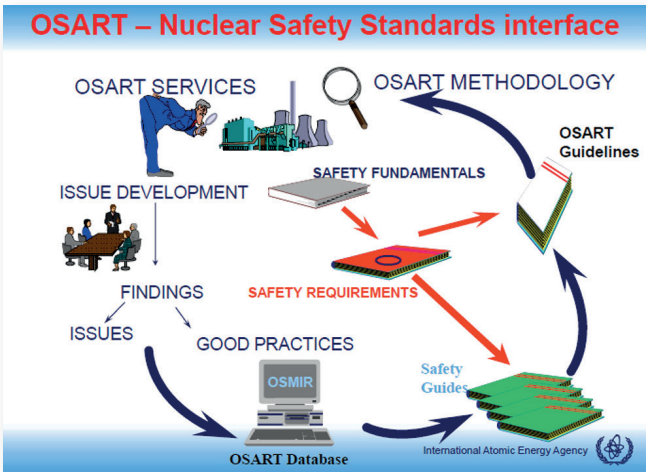


FIG. 1. OSART –IAEA safety standards interface.

mission, an assessment of the safety culture at the plant is included in the report of the mission.

Currently, the following types of mission are available.

OSART missions to plants in operation

OSART missions can be conducted at any time after a plant begins commercial operation. They are not normally conducted during the first year of operation, or before completion of the first refuelling cycle outage for light water reactors. These missions focus on the performance of management processes and plant personnel in achieving safe operation. OSART missions usually review performance in the following ten standard areas:

- Management, organization and administration (MOA);
- Training and qualification (TQ);
- Operations (OPS);
- Maintenance (MA);
- Technical support (TS);
- Operating experience (OE);

- Radiation protection (RP);
- Chemistry (CH);
- Emergency planning and preparedness (EPP);
- Severe accident management (SAM)¹.

In addition, safety culture is systematically reviewed within the framework of a standard OSART mission.

On the recommendation of the IAEA's Office of Internal Oversight Services, four optional review areas were added to the OSART review scope:

- Long term operation (LTO);
- PSA applications (PSAA);
- Transition from operation to decommissioning (TRA);
- Independent safety culture analysis (ISCA).

Long term operation (LTO)

Long term operation is defined as nuclear power plant operation beyond the originally planned service life set forth by the licence term, design limits, standards or regulations. Various activities conducted at nuclear power plants, including periodic safety review, ageing management and plant modification, are relevant to LTO.

The purpose of the LTO review is to assist nuclear power plant operators in adopting a proper approach to LTO of their plants and in implementing complete and appropriate activities to ensure that plant safety will be maintained during the LTO period.

PSA applications (PSAA)

Probabilistic safety assessment of nuclear power plants complements the traditional deterministic analysis and is widely recognized as a comprehensive, structured

¹ Introduced as a standard area in the light of the accident at the Fukushima Daiichi nuclear power plant.

approach to identifying accident scenarios and deriving numerical estimates of risks dealing with nuclear power plant operation and associated plant vulnerabilities.

Many operating organizations pursue various PSA applications to support efficient and safe plant operation.

The purpose of the PSAA review is to assist nuclear power operators to ensure consistency and effectiveness of the development and use of PSA to enhance the safety of plants.

Transition from operation to decommissioning (TRA)

The transitional period is the stage in the life cycle of any nuclear facility when the facility is still in the operational phase but is preparing for the decommissioning process.

Effective planning of the transitional period is very important for safe and timely decommissioning.

The purpose of the TRA review is to assist nuclear power plant operators in maintaining standards of safety during this transitional period.

Independent safety culture assessment (ISCA)

The overall purpose of an independent safety culture assessment (ISCA) is to provide advice and assistance to Member States in enhancing the safety culture of a nuclear facility. The IAEA offers ISCA's within the framework of an OSART review to benefit from the synergy between the reviews performed by technical experts and by behavioural science and safety culture experts.

The joint operational safety and safety culture assessment provides the organization the opportunity to better understand the interactions between technical, organizational and cultural aspects. This approach helps

the organization to take actions that fully address the root causes of identified issues.

The ISCA process is based on a scientific approach to safety culture and follows the IAEA safety standards. It uses several assessment methods such as survey, interviews, observations, focus groups and document review. The findings of technical experts are also integrated into the analysis.

Pre-OSART missions to plants under construction/ commissioning

Pre-Operational Safety Review Team (Pre-OSART) missions are conducted during the construction and commissioning phase of a plant's life cycle. The purpose of the missions conducted during construction is to assist the utility in achieving high standards of engineering and construction and to help ensure effective preparations for commissioning and operations. The areas reviewed are based on the status of the plant with regard to construction and commissioning. Pre-OSART missions that are conducted close to the time of initial start-up normally review the same areas as a regular OSART mission plus the commissioning (COM) area.



Such pre-OSART missions provide the greatest value if they are conducted from three to six months before initial fuel loading. At this time, the plant processes and procedures affecting safety have already been established, plant staff have been recruited and trained, and some systems have moved to temporary or final operation. This allows the review to focus on how well the plant is prepared for initial fuel loading, reactor start-up and subsequent plant operation. The recommendations and suggestions of the Pre-OSART mission in the pre-operational phase still can be addressed with corrective actions before plant operation commences.

In addition to OSART and Pre-OSART missions, Corporate OSART missions are available. Corporate OSART missions are organized to review those centralized functions of the corporate organization of a utility with multiple nuclear plant sites (and possibly conventional plant sites and other business areas) that affect all the operational safety aspects of the nuclear plants of that utility.

Transparency and accountability

Transparency and accountability are attributes that promote nuclear safety and public confidence in nuclear energy throughout the world. The OSART programme is designed to promote these attributes. The OSART review process is based on guidelines derived from the IAEA safety standards, which are publicly accessible. Restrictions on the OSART report are removed 90 days after its official distribution to the host country, unless otherwise requested. Many host countries and/or host plants post the OSART reports on their web sites to ensure transparency to the public. The IAEA has also begun posting on its web site a summary of the results of OSART missions conducted since 2002.



OSART over the past 30 years

- 1982 Establishment of the OSART programme
- 1983 First OSART mission, to the Ko-Ri nuclear power plant in the Republic of Korea
- 1987 First OSART follow-up visit, to the Borselle nuclear power plant in the Netherlands (follow-up visits became a standard feature of the OSART programme in 1989)
- 1998 100th OSART mission, to the Golfech nuclear power plant in France
- 2002 20 year anniversary of the OSART programme (116 OSART missions)
- 2009 150th OSART mission, to the Mihama nuclear power plant in Japan

HOW IS AN OSART MISSION CARRIED OUT?

Sequence of events

The OSART process consists of three major stages:

- Preparatory meeting and seminar on field inspection techniques;
- OSART mission;
- Follow-up visit.

The OSART process starts with a preparatory meeting and seminar on field inspection techniques, which enables the operator to begin the improvement process one year before the OSART mission. It proceeds through to the OSART mission itself, and finally to a follow-up visit, normally about 18 months later (see Fig. 2).



FIG. 2. Overview of the OSART programme.

Preparing for an OSART mission

The OSART process is initiated by a request from a Member State to review performance at a specific nuclear power plant. This is followed by the arrangement of a

preparatory meeting with the plant management and other organizations involved, and the recruitment of experts for the review team.

A preparatory meeting is held at the plant site and is usually attended by the team leader and deputy team leader. It takes place about one year prior to the start of the OSART mission. Other organizations involved, such as regulatory authorities and emergency planning authorities, are welcome to attend the meeting. If desired, a separate preparatory meeting may also be conducted with the regulatory authority. These meetings allow those responsible to ensure that the review is carried out effectively in order to reach a common understanding on the conduct of the OSART mission. The participants discuss the main features of the OSART programme and the plant's preparation for the review. The preparation of a self-assessment advance information package (AIP) for team members, designation of a host plant peer (HPP) and plant counterparts, logistical support, arrangements for reporting mission results and any intended involvement of the media are also discussed. A seminar for applying the OSART methodology and field inspection techniques for the plant's self-assessment is conducted at this time. It includes a field inspection by the plant staff under the coaching of IAEA staff. This seminar helps to enhance self-assessment at the plant and to improve the participants' understanding of the OSART methodology.

A commitment for funding an OSART mission has to be formally confirmed by the utility, the nuclear power plant or the regulatory authority. For developing countries, funding for OSART missions may be provided by the IAEA Technical Cooperation Fund.

Composition of the team

An OSART team usually consists of one experienced nuclear power plant expert for each area under review, except for the operations area, where two experts are



employed. Typically, more than two thirds of the team are senior managers from nuclear power plants or other organizations outside the host country; the remaining team members are IAEA staff. The objective is for approximately 50% of the industry experts to have had previous experience either on OSART missions or on peer evaluation teams. Occasionally, a member of a regulatory body from outside the host country is a team member, provided that he or she has the required experience.

The cumulative nuclear related experience of the team often exceeds 300 years.

The review team includes up to three observers from countries whose nuclear programmes are developing or where future OSART missions are planned.

Experts are recruited on the basis of their technical skills in the area they will review, their evaluation skills and their knowledge of the OSART working language (English). These experts change from one OSART mission to the next. The IAEA staff members also have experience in the nuclear industry as well as demonstrated evaluation skills. They have taken part in many evaluations and provide the necessary consistency

within the OSART process and coherence concerning application of the IAEA safety standards, as well as knowledge of various national practices. This knowledge is further disseminated when they return to their home country.

The team leader and deputy team leader of each OSART mission are senior IAEA officers who are responsible for the overall conduct of the mission. This includes coordination and liaison with the host utility, the host plant and the regulatory authority. They also provide training and guidance to the teams to help ensure coherent and consistent reviews. Table 2 shows the origin of OSART experts and observers for missions conducted from 1983 to May 2012.

Advance information package (AIP)

To enable an OSART team to perform effectively and efficiently while on-site, the nuclear power plant prepares a self-assessment AIP. This package is sent to the team members prior to the OSART mission so that they can familiarize themselves with the plant organization, administration, layout, performance and general design before they begin the review. The AIP includes a section dedicated to each review area, including general administrative information. The AIP also contains information on general logistics such as hotel and transportation arrangements. Information needs are minimized to avoid undue translation costs for the plant.

Plant counterparts and host plant peer (HPP)

The plant is requested to designate a plant counterpart for each review area and an HPP prior to the OSART mission. Each counterpart is a senior plant member whose sole responsibility during the entire mission is the review of his or her designated area. During the OSART mission, the plant counterpart reviews with the OSART reviewer good practices, performance weaknesses

Table 2. Origin of experts and observers in OSART missions from 1983 to May 2012

Member State	Experts	Observers
Argentina	7	3
Armenia	5	4
Australia	—	2
Austria	2	2
Belgium	48	4
Brazil	30	16
Bulgaria	17	20
Canada	87	—
China	15	27
Cuba	—	10
Czech Republic	40	11
Czechoslovakia ^a	7	7
Estonia	—	1
Finland	41	4
France	96	10
Germany	113	1
Hungary	48	7
India	6	2
Iran, Islamic Republic of	—	4
Italy	17	—
Japan	46	2
Kazakhstan	—	1
Korea, Republic of	18	15
Lithuania	3	5
Mexico	4	10
Netherlands	25	2
Pakistan	4	16
Philippines	1	3
Poland	—	7
Portugal	—	1
Romania	12	11
Russian Federation	15	17
Slovakia	47	6
Slovenia	16	6
South Africa	14	1
Soviet Union ^a	7	2
Spain	45	3
Sweden	73	9
Switzerland	24	2
Ukraine	3	13
United Kingdom	104	—
United States of America	147	3
Yugoslavia ^a	11	4
TOTAL	1198	274

^a Member State at the time the experts and observers were recruited.

and opportunities for improvement, and provides coordination with specialist staff as required. The HPP is also a senior plant staff member with good overall knowledge of plant programmes, practices and staff. The HPP fully participates in team meetings and activities during the mission and is requested to advise the team when information may not be complete or correct.

Carrying out the review

A couple of months before the OSART mission, the interactive OSART training tool is distributed to reviewers. This training tool, which includes a number of self-tests, enables reviewers to acquire overall basic knowledge of the OSART methodology. In addition, at the beginning of the OSART mission period, team members receive thorough team training. The purposes of the team training are:

- To provide information on the OSART programme, the mission schedule, review and evaluation skills, and the expectations of team members;
- To discuss factors unique to the mission and the nuclear power plant;
- To begin to develop a working team.

The plant counterparts are also invited to the team training.

As a result of their study of the AIP, when the OSART members arrive at a plant site, they are already familiar with the plant's main features, operating characteristics, history, regulatory provisions, technical specifications, procedures, organization and key personnel. The first day is used for plant access formalities and to brief the team members on applicable security, radiation protection, fire protection, emergency preparedness and industrial safety requirements. In addition, team training is conducted by the team leader and deputy team leader. On the second day, an entrance meeting with senior plant management is

conducted. The experts then join their plant counterparts, who are the designated plant experts in the areas being reviewed. Together they carry out an initial tour of the plant and make final arrangements for the review.

The standard OSART schedule (see Tables 3 and 4) shows the activities of the team during the three weeks of the mission. Deviations from the schedule to take local conditions and the availability of plant counterparts into account are possible, as long as the overall coverage of each topic is not compromised. The review of each topic often starts with a brief presentation outlining the power plant's programmes and performance in the subject area. This is followed by a question and answer period, review of documents, and observations in the field to determine whether operational safety performance is consistent with the guidelines and good international practice. Normally more than half of the review period is spent in the field to focus on plant performance rather than on programmes.

Throughout the mission, there are detailed discussions with the plant counterparts to verify that the review team has a correct understanding of the plant's good practices/performance and opportunities for improvement. The contribution of the plant counterparts is essential to verify that the experts' observations are correct, and to ensure that they understand the written material, that they are not being misled by any shortcomings in translation or interpretation, and that the practices observed are representative.

The team meets each day to review and share the results of its activities and, through discussion, to develop a team consensus on emerging issues. The team's discussions help to ensure that all team members are well informed of the progress of the review and benefit from the observations of other experts. These meetings are also an opportunity for the team leader to reinforce the review methodology and his or her expectations.

Ultimately, the team's recommendations, suggestions and good practices are arrived at by consensus rather than as a consequence of one individual's opinion. They must be significant to improving safety performance, and must be based on facts and referenced to the IAEA safety standards.

As the review proceeds, the team leader informs the plant management (and the regulatory authority, if requested) daily on the progress made. Opportunities for improvement and areas of uniquely outstanding performance are discussed as they emerge. The last days of the mission are reserved for rechecking any open topics, and for completing the technical notes and discussing them in their entirety with the plant counterparts. Additionally, each team member drafts a summary of his or her review area for the technical notes and for the oral presentation at the exit meeting.



Table 3. Overview of OSART site activities

	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
Week 1			Team training Plant training	Entrance meeting Plant tour	Review and daily meeting with the counterparts and team		
Week 2			Review and daily meeting with the counterparts and team				
Week 3	Start draft technical notes		Finish draft technical notes	Team consensus on findings	Finalize technical notes; discuss with plant counterparts Preparation for exit meeting speech	Exit meeting Departure	

Table 4. Standard OSART schedule

<i>Week 1</i>				
	Monday	Tuesday	Wednesday	Thursday
Management, organization and administration	Team training	Entrance meeting	Management of safety, corporate and plant organization, authorities and responsibilities, management approach, techniques, goals and objectives	
Training and qualification	Arrangement of access	<ul style="list-style-type: none"> Plant features Operating history Regulatory system 	Policy and organization Programmes and records	Training facilities, equipment and material
	Plant training	Plant tour	Organization and functions, shift schedule	Quality of the training programme
Operations I and II	<ul style="list-style-type: none"> Radiological and industrial safety orientation Whole body count 		Conduct of operations in the control room	Conduct of field operations
Maintenance			Conduct of field operations	Work authorization
			Organization and functions	Procedures, records and history
Technical support			Master of Arts programmes: preventive, corrective and predictive	
Operating experience			Organization and functions	Plant modification system
			Organization and functions	Experience feedback and event analysis (radiation protection, chemistry, training, safety and quality)
Radiation protection			Operating history Database management	
			Organization and functions	Radiation work control
			Radiation protection instrumentation, protective clothing and facilities	
Chemistry			Organization and functions, operating history	Radiation work control
			Laboratories, equipment and instrumentation	Chemistry control in plant system: activity build-up
Emergency planning and preparedness			On-site emergency plans Implementation procedures	Interface with off-site organizations
Severe accident management			Emergency programme, response functions	
			Severe accident management strategies	Procedures and guidelines

Table 4. Standard OSART schedule (cont.)

Week 2						
	Monday	Tuesday	Wednesday	Thursday	Friday	
Management, organization and administration	Management of safety Quality assurance: Programmes, auditing, reporting and tracking		Management of safety, local and corporate safety committees	Management of safety Industrial safety programme	Management of safety, documents and record management	
Training and qualification	Control room operators and shift supervisors	Field operators	Maintenance personnel Technical plant support personnel	Managers, supervisors, training personnel	General employee training	
Operations I and II	Operating limits and conditions	Operating rules and procedures	Surveillance testing	Operator aids, emergency operating procedures		
Maintenance	Temporary modifications	Surveillance testing	Fire prevention and protection programme	Management of accident conditions		
	Conduct and control of maintenance activities, material conditions		In-service inspection	Stores and warehouses, outage management		
Technical support	Periodic safety review	Ageing management	Reactor core management	Handling of fuel and core components	Computer systems important to safety	
Operating experience	Human factor related events	Experience feedback (outages, fire protection, industrial safety)	Corrective actions, effectiveness		Corporate operating experience support, sharing events with external nuclear community	
Radiation protection	Regulations, procedures, programme and records	Radioactive waste management and discharge environmental surveillance	Control of occupational exposure		Radiation protection support during emergencies	
Chemistry	Surveillance programmes and procedures	Chemical treatment policies	Discharge and post-accident sampling	Quality control of operational chemicals	Radiochemical measurements	
Emergency planning and preparedness	Emergency response facilities	Emergency equipment and resources	Training, drills and exercises		Quality assurance	
Severe accident management	Procedures and guidelines	Responsibility and plant emergency arrangements	Verification and validation of procedures and guidelines		Training needs and training performance	

Table 4. Standard OSART schedule (cont.)

<i>Week 3</i>				
	Saturday (2nd week)	Monday	Tuesday	Wednesday
All areas	Start draft technical notes	Finish draft technical notes	Meeting to obtain team consensus on draft technical notes	Finalize technical notes, discuss with plant counterparts Preparation for exit meeting speech
				Thursday Exit meeting Departure

Evaluation criteria

The evaluation criteria for recommendations and suggestions are based on the relevant IAEA safety standards. The most basic publications are the Safety Requirements publication entitled Safety of Nuclear Power Plants: Commissioning and Operation (IAEA Safety Standards Series No. SSR-2/2) and the associated Safety Guides. Safety standards for the management system and for preparedness and response to a nuclear or radiological emergency are applied. The relevant IAEA safety standards and related publications are listed at the end of this brochure. OSART guidelines have been developed to enable efficient conduct of the reviews and to supplement the IAEA safety standards. The evaluations are made on the basis of the guidelines and of the extensive experience and knowledge of each team member. Team members are selected to ensure that a variety of national approaches to operational safety are represented. Each expert is knowledgeable in his or her particular area, as well as in other review areas, so that the relevance of issues identified by individual team members can be discussed by the whole team.

Follow-up visit after the mission

Approximately 18 months after the OSART mission, a follow-up visit takes place. During this visit, a group of three to five team members evaluates the progress made in resolving the issues raised by the OSART mission. This is done by interviewing personnel, reviewing documentation and conducting field visits. The status of the plant response to each recommendation and suggestion is determined by the follow-up team and is included in the final mission report. In the past ten years, almost all of the issues found in OSART missions had been resolved or had shown satisfactory progress at the time of the follow-up visit (see Fig. 3).

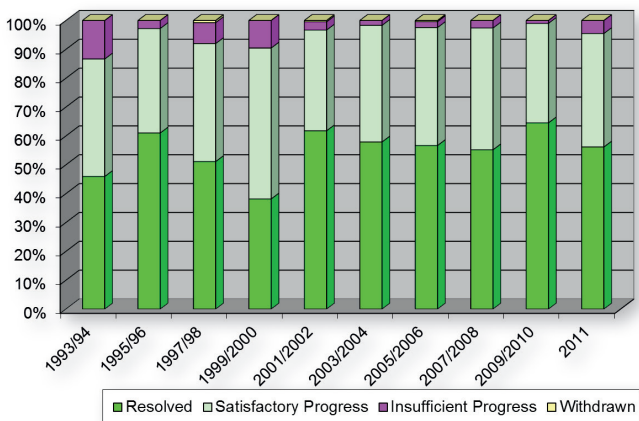


FIG. 3. OSART issue resolution at the follow-up visit.

Reporting the results

While on the site, the OSART members write technical notes on their observations and conclusions. These notes are the preliminary report of mission results to the host plant and are discussed in detail with the plant counterparts. They are also the basis for the team members' oral presentations at the exit meeting. The technical notes are presented to the plant management before the team leaves. These technical notes are not the official report and are given only to the host plant. They form the basis of the official report prepared by the team leader and deputy team leader after each mission. This report summarizes the team's observations and conclusions, and includes references to all recommendations, suggestions and good practices identified by the team.

Before the official report is finalized, the host plant and regulatory authority concerned are given the opportunity to provide comments. The approved official report is then submitted through official channels to the Member State that requested the OSART mission. Distribution of each official report is initially restricted to the IAEA, the OSART members, and the utility and regulatory authority



involved. Any further distribution at this time is at the discretion of the Member State. Ninety days after the official report is issued it is automatically derestricted, unless the host country requests otherwise.

The results of follow-up visits are reported in a similar manner, with technical notes being presented to the plant management before the team leaves the site. An official detailed report is then prepared, using the findings of the original mission augmented with the results of the follow-up visit. Publication of the official detailed report proceeds as before, with an opportunity for the host country to comment, followed by initial restricted distribution and automatic derestriction after 90 days, unless the host country requests otherwise. Since 1986, most of the OSART reports have been derestricted and made available to interested individuals and organizations. Summaries of reports have been uploaded to the IAEA web site and are available to all Member States.

OSMIR database

The OSART Mission Results (OSMIR) database contains the results of OSART missions and their follow-up visits

from 1991 onwards. The database can, for example, provide information on OSART results for specific review areas and individual topics within those review areas from OSART missions. This database is set up using Microsoft Access 2000 and distributed on CD-ROM to organizations and individuals in the nuclear industry as a source of information that can help them strengthen nuclear safety performance. The database is continuously updated with the results of OSART missions. It can be obtained, upon request, from the Operational Safety Section of the IAEA's Division of Nuclear Installation Safety.

In addition, the OSART web site (<http://www-ns.iaea.org/reviews/op-safety-reviews.asp?s=7&l=49#osart>) contains OSART good practices and other relevant materials which can be accessed on the main IAEA web site.

Outlook for the future

The IAEA closely monitors the OSART programme in an effort to increase its usefulness and effectiveness, incorporating new features and eliminating outdated ones.



The feedback of experience takes place in various ways. At the end of each mission, the OSART members complete questionnaires that provide feedback on the OSART process, including proposals for improvement. Similarly, the nuclear power plants and utilities are asked to provide feedback on each OSART mission.

IAEA technical meetings and other meetings with industry experts have been held to collect suggestions and opinions on the programme. The OSART guidelines have been revised to reflect industry-wide progress in nuclear safety and feedback from various sources. The information acquired through the programme has been used to update the IAEA safety standards. In this way, the OSART programme has been helping to ensure that the IAEA safety standards are universally accepted.

RELEVANT IAEA PUBLICATIONS

Series/number	Title
Safety Standards	
SF-1	Fundamental Safety Principles
SSR-2/1	Safety of Nuclear Power Plants: Design
SSR-2/2	Safety of Nuclear Power Plants: Commissioning and Operation
GSR Part 1	Governmental, Legal and Regulatory Framework for Safety
GSR Part 3	Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards
GSR Part 4	Safety Assessment for Facilities and Activities
GSR Part 5	Predisposal Management of Radioactive Waste
GS-R-2	Preparedness and Response for a Nuclear or Radiological Emergency
GS-R-3	The Management System for Facilities and Activities
NS-G-1.1	Software for Computer Based Systems Important to Safety in Nuclear Power Plants
NS-G-2.1	Fire Safety in the Operation of Nuclear Power Plants
NS-G-2.2	Operational Limits and Conditions and Operating Procedures for Nuclear Power Plants
NS-G-2.3	Modifications to Nuclear Power Plants
NS-G-2.4	The Operating Organization for Nuclear Power Plants
NS-G-2.5	Core Management and Fuel Handling for Nuclear Power Plants
NS-G-2.6	Maintenance, Surveillance and In-service Inspection in Nuclear Power Plants

Series/number	Title
Safety Standards	
NS-G-2.7	Radiation Protection and Radioactive Waste Management in the Operation of Nuclear Power Plants
NS-G-2.8	Recruitment, Qualification and Training of Personnel for Nuclear Power Plants
NS-G-2.9	Commissioning for Nuclear Power Plants
NS-G-2.10	Periodic Safety Review of Nuclear Power Plants
NS-G-2.11	A System for the Feedback of Experience from Events in Nuclear Installations
NS-G-2.12	Ageing Management for Nuclear Power Plants
NS-G-2.13	Evaluation of Seismic Safety for Existing Nuclear Installations
NS-G-2.14	Conduct of Operations at Nuclear Power Plants
NS-G-2.15	Severe Accident Management Programmes for Nuclear Power Plants
GSG-1	Classification of Radioactive Waste
GSG-2	Criteria for Use in Preparedness and Response for a Nuclear or Radiological Emergency
GS-G-2.1	Arrangement for Preparedness for a Nuclear or Radiological Emergency
GS-G-3.1	Application of the Management System for Facilities and Activities
GS-G-3.5	The Management System for Nuclear Installations
GS-G-4.1	Format and Content of the Safety Analysis Report for Nuclear Power Plants
SSG-2	Deterministic Safety Analysis for Nuclear Power Plants

Series/number	Title
Safety Standards	
SSG-3	Development and Application of Level 1 Probabilistic Safety Assessment for Nuclear Power Plants
SSG-4	Development and Application of Level 2 Probabilistic Safety Assessment for Nuclear Power Plants
SSG-13	Chemistry Programme for Water Cooled Nuclear Power Plants
RS-G-1.1	Occupational Radiation Protection
RS-G-1.2	Assessment of Occupational Exposure Due to Intakes of Radionuclides
RS-G-1.3	Assessment of Occupational Exposure Due to External Sources of Radiation
RS-G-1.8	Environmental and Source Monitoring for Purposes of Radiation Protection
WS-G-2.5	Predisposal Management of Low and Intermediate Level Radioactive Waste
WS-G-6.1	Storage of Radioactive Waste
Safety Series	
No.117	Operation of Spent Fuel Storage Facilities
INSAG publications	
INSAG-4	Safety Culture
INSAG-10	Defence in Depth in Nuclear Safety
INSAG-12	Basic Safety Principles for Nuclear Power Plants, 75-INSAG-3 Rev.1
INSAG-13	Management of Operational Safety in Nuclear Power Plants
INSAG-14	Safe Management of the Operating Lifetimes of Nuclear Power Plants

Series/number	Title
INSAG publications	
INSAG-15	Key Practical Issues in Strengthening Safety Culture
INSAG-16	Maintaining Knowledge, Training and Infrastructure for Research and Development in Nuclear Safety
INSAG-17	Independence in Regulatory Decision Making
INSAG-18	Managing Change in the Nuclear Industry: The Effects on Safety
INSAG-19	Maintaining the Design Integrity of Nuclear Installations throughout Their Operating Life
INSAG-20	Stakeholder Involvement in Nuclear Issues
INSAG-23	Improving the International System for Operating Experience Feedback
INSAG-25	A Framework for an Integrated Risk Informed Decision Making Process
Safety Reports Series	
No.1	Examples of Safety Culture Practices
No.11	Developing Safety Culture in Nuclear Activities — Practical Suggestions to Assist Progress
No.21	Optimization of Radiation Protection in the Control of Occupational Exposure
No.48	Development and Review of Plant Specific Emergency Operating Procedures
Other IAEA Publications	
IAEA Safety Glossary	Terminology Used in Nuclear Safety and Radiation Protection, 2007 Edition
Services Series No.12	OSART Guidelines, 2005 Edition

Series/number	Title
Other IAEA Publications	
EPR-EXERCISE-2005	Preparation, Conduct and Evaluation of Exercises to Test Preparedness for a Nuclear or Radiological Emergency
EPR-METHOD-2003	Method for Developing Arrangements for Response to a Nuclear or Radiological Emergency
EPR-ENATOM-2002	Emergency Notification and Assistance, Technical Operations Manual



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