

INSAG-23

Improving the
International System for
Operating Experience
Feedback

INSAG-23

A REPORT BY THE
INTERNATIONAL NUCLEAR SAFETY GROUP

INSAG



IAEA

International Atomic Energy Agency

IAEA SAFETY RELATED PUBLICATIONS

IAEA SAFETY STANDARDS

Under the terms of Article III of its Statute, the IAEA is authorized to establish or adopt standards of safety for protection of health and minimization of danger to life and property, and to provide for the application of these standards.

The publications by means of which the IAEA establishes standards are issued in the **IAEA Safety Standards Series**. This series covers nuclear safety, radiation safety, transport safety and waste safety, and also general safety (i.e. all these areas of safety). The publication categories in the series are **Safety Fundamentals**, **Safety Requirements** and **Safety Guides**.

Safety standards are coded according to their coverage: nuclear safety (NS), radiation safety (RS), transport safety (TS), waste safety (WS) and general safety (GS).

Information on the IAEA's safety standards programme is available at the IAEA Internet site

<http://www-ns.iaea.org/standards/>

The site provides the texts in English of published and draft safety standards. The texts of safety standards issued in Arabic, Chinese, French, Russian and Spanish, the IAEA Safety Glossary and a status report for safety standards under development are also available. For further information, please contact the IAEA at P.O. Box 100, 1400 Vienna, Austria.

All users of IAEA safety standards are invited to inform the IAEA of experience in their use (e.g. as a basis for national regulations, for safety reviews and for training courses) for the purpose of ensuring that they continue to meet users' needs. Information may be provided via the IAEA Internet site or by post, as above, or by email to Official.Mail@iaea.org.

OTHER SAFETY RELATED PUBLICATIONS

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

Reports on safety and protection in nuclear activities are issued as **Safety Reports**, which provide practical examples and detailed methods that can be used in support of the safety standards.

Other safety related IAEA publications are issued as **Radiological Assessment Reports**, the International Nuclear Safety Group's **INSAG Reports**, **Technical Reports** and **TECDOCs**. The IAEA also issues reports on radiological accidents, training manuals and practical manuals, and other special safety related publications. Security related publications are issued in the **IAEA Nuclear Security Series**.

IMPROVING THE INTERNATIONAL SYSTEM
FOR OPERATING EXPERIENCE FEEDBACK

INSAG-23

A report by the International Nuclear Safety Group

The following States are Members of the International Atomic Energy Agency:

AFGHANISTAN	GREECE	NORWAY
ALBANIA	GUATEMALA	PAKISTAN
ALGERIA	HAITI	PALAU
ANGOLA	HOLY SEE	PANAMA
ARGENTINA	HONDURAS	PARAGUAY
ARMENIA	HUNGARY	PERU
AUSTRALIA	ICELAND	PHILIPPINES
AUSTRIA	INDIA	POLAND
AZERBAIJAN	INDONESIA	PORTUGAL
BANGLADESH	IRAN, ISLAMIC REPUBLIC OF	QATAR
BELARUS	IRAQ	REPUBLIC OF MOLDOVA
BELGIUM	IRELAND	ROMANIA
BELIZE	ISRAEL	RUSSIAN FEDERATION
BENIN	ITALY	SAUDI ARABIA
BOLIVIA	JAMAICA	SENEGAL
BOSNIA AND HERZEGOVINA	JAPAN	SERBIA
BOTSWANA	JORDAN	SEYCHELLES
BRAZIL	KAZAKHSTAN	SIERRA LEONE
BULGARIA	KENYA	SINGAPORE
BURKINA FASO	KOREA, REPUBLIC OF	SLOVAKIA
CAMEROON	KUWAIT	SLOVENIA
CANADA	KYRGYZSTAN	SOUTH AFRICA
CENTRAL AFRICAN REPUBLIC	LATVIA	SPAIN
CHAD	LEBANON	SRI LANKA
CHILE	LIBERIA	SUDAN
CHINA	LIBYAN ARAB JAMAHIRIYA	SWEDEN
COLOMBIA	LIECHTENSTEIN	SWITZERLAND
COSTA RICA	LITHUANIA	SYRIAN ARAB REPUBLIC
CÔTE D'IVOIRE	LUXEMBOURG	TAJIKISTAN
CROATIA	MADAGASCAR	THAILAND
CUBA	MALAWI	THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA
CYPRUS	MALAYSIA	TUNISIA
CZECH REPUBLIC	MALI	TURKEY
DEMOCRATIC REPUBLIC OF THE CONGO	MALTA	UGANDA
DENMARK	MARSHALL ISLANDS	UKRAINE
DOMINICAN REPUBLIC	MAURITANIA	UNITED ARAB EMIRATES
ECUADOR	MAURITIUS	UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND
EGYPT	MEXICO	UNITED REPUBLIC OF TANZANIA
EL SALVADOR	MONACO	UNITED STATES OF AMERICA
ERITREA	MONGOLIA	URUGUAY
ESTONIA	MONTENEGRO	UZBEKISTAN
ETHIOPIA	MOROCCO	VENEZUELA
FINLAND	MOZAMBIQUE	VIETNAM
FRANCE	MYANMAR	YEMEN
GABON	NAMIBIA	ZAMBIA
GEORGIA	NETHERLANDS	ZIMBABWE
GERMANY	NEW ZEALAND	
GHANA	NICARAGUA	
	NIGER	
	NIGERIA	

The Agency's Statute was approved on 23 October 1956 by the Conference on the Statute of the IAEA held at United Nations Headquarters, New York; it entered into force on 29 July 1957. The Headquarters of the Agency are situated in Vienna. Its principal objective is "to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world".

INSAG-23

IMPROVING THE
INTERNATIONAL SYSTEM FOR
OPERATING EXPERIENCE FEEDBACK

INSAG-23

A report by the International Nuclear Safety Group

INTERNATIONAL ATOMIC ENERGY AGENCY
VIENNA, 2008

COPYRIGHT NOTICE

All IAEA scientific and technical publications are protected by the terms of the Universal Copyright Convention as adopted in 1952 (Berne) and as revised in 1972 (Paris). The copyright has since been extended by the World Intellectual Property Organization (Geneva) to include electronic and virtual intellectual property. Permission to use whole or parts of texts contained in IAEA publications in printed or electronic form must be obtained and is usually subject to royalty agreements. Proposals for non-commercial reproductions and translations are welcomed and considered on a case-by-case basis. Enquiries should be addressed to the IAEA Publishing Section at:

Sales and Promotion, Publishing Section
International Atomic Energy Agency
Wagramer Strasse 5
P.O. Box 100
1400 Vienna, Austria
fax: +43 1 2600 29302
tel.: +43 1 2600 22417
email: sales.publications@iaea.org
<http://www.iaea.org/books>

© IAEA, 2008

Printed by the IAEA in Austria
September 2008
STI/PUB/1349

IAEA Library Cataloguing in Publication Data

Improving the international system for operating experience feedback :
INSAG-23 / a report by the International Nuclear Safety Group. —
Vienna : International Atomic Energy Agency, 2008.
p. ; 24 cm. — (INSAG series, ISSN 1025-2169 ;
INSAG-23)
STI/PUB/1349
ISBN 978-92-0-108008-0
Includes bibliographical references.

1. Nuclear power plants — Safety measures. 2. Nuclear reactors —
Safety measures. 3. International agencies. 4. International
organization. I. International Atomic Energy Agency. II. International
Nuclear Safety Group. III. Series.

IAEAL

08-00532

The International Nuclear Safety Group (INSAG) is a group of experts with high professional competence in the field of nuclear safety working in regulatory organizations, research and academic institutions and the nuclear industry. INSAG is constituted under the auspices of the International Atomic Energy Agency (IAEA) with the objective of providing authoritative advice and guidance on nuclear safety approaches, policies and principles for nuclear installations (defined as nuclear power plants, fuel cycle facilities, research reactors and support facilities). In particular, INSAG provides recommendations and informed opinions on current and emerging nuclear safety issues, to the international nuclear community and public through the offices of the IAEA.

FOREWORD

**by Richard A. Meserve
Chairman of INSAG**

The philosopher George Santayana once observed that those who do not learn from the past are condemned to repeat it. The operating experience from existing plants can provide important lessons from which all should benefit. It is widely observed that serious accidents are nearly always preceded by less serious precursor events. If the lessons can be learned from the precursor events, the probability of a serious accident could be significantly reduced. This requires strong national and international systems for operating experience feedback. Although some strong national systems are in place, there is a need for strengthening of the international system. Indeed, the international system is an essential resource for those countries with only one or a few nuclear facilities. Although the need to enhance the system for operating experience feedback has been discussed in recent years, little tangible progress has as yet been seen. This matter deserves increased attention.

Reporting by national authorities is uneven and sometimes tardy or lacking clarity. Equally important, there should be an emphasis on identifying and distributing the key lessons to be learned and the actions to be taken to respond to those lessons in a user friendly fashion. A truly effective operating experience feedback programme would collect information about all significant corrective actions, regardless of the precipitating justification, as well as vital research results that identify or resolve an important safety concern.

The development of a more effective system for operating experience feedback will require investments by operators and regulators, as well as by the international community. However, we believe that a comparatively small investment in enhanced capacities could have a meaningful payoff in accident avoidance. We should exploit the knowledge that can be gained from careful and thorough efforts to learn from existing operations.

CONTENTS

1.	INTRODUCTION	1
1.1.	Background	1
1.2.	Objective	2
1.3.	Scope and importance of OEF	3
2.	ROLE OF ORGANIZATIONS	4
2.1.	National organizations	4
2.2.	International organizations	7
3.	CONCLUSIONS AND RECOMMENDATIONS	14
	REFERENCES	16
	MEMBERS OF THE INTERNATIONAL NUCLEAR SAFETY GROUP.....	17
	PUBLICATIONS OF THE INTERNATIONAL NUCLEAR SAFETY GROUP.....	18

1. INTRODUCTION

1.1. BACKGROUND

1. Energy is an essential foundation for economic and personal well-being. The energy needs of the world's ever growing population must be met, and nuclear power could play a central and long term role in the global energy supply. However, the opportunities offered by nuclear power depend on continued public trust in its safety. This trust could be quickly lost if an accident causing large radioactive releases were to occur anywhere in the world.

2. It is widely observed in all fields of human activity that serious accidents are nearly always preceded by less serious precursor events. If lessons can be learned from the precursors and these lessons put into practice, the probability of a serious accident occurring can be significantly reduced.

3. The operational safety performance of nuclear facilities has, in general, improved notably over time throughout the world. This has been achieved, in part, through operating experience feedback (OEF) and the introduction of new technology. While the continued strong safety performance by operators is encouraging, safety significant events continue to recur in nuclear installations. This indicates that operators are not learning and applying the lessons that experience can teach us.

4. By signing the international Convention on Nuclear Safety (CNS) [1], each Contracting Party commits to taking the appropriate steps to ensure that:

“... incidents significant to safety are reported in a timely manner by the holder of the relevant licence to the regulatory body; [and that] programmes to collect and analyse operating experience are established, the results obtained and the conclusions drawn are acted upon and that existing mechanisms are used to share important experience with international bodies and with other operating organizations and regulatory bodies”.

All Contracting Parties have indicated in the review meetings of the CNS that they have such programmes in place. These programmes have been valuable. Nonetheless, events do recur and this gives INSAG reason to believe that the mechanisms for operating experience feedback are not as effective as they

could be. INSAG concludes that significant safety benefits could be achieved by enhancing national and international OEF programmes.

5. The experience gained by operators from their own nuclear facilities provides direct insights into the needs and means to reduce observed safety risks. Within each country, the national regulator has a duty to ensure that information on appropriate corrective measures is transferred to all operators in the country and that appropriate safety enhancing measures are taken by each operator.

6. However, the number of nuclear power plants in any one country is just a fraction of the global nuclear fleet, and a large amount of valuable operating experience is available from nuclear plants in other countries. All countries thus can benefit from the availability of a strong international OEF system. And such a system may be of critical importance to countries with limited experience or only a few nuclear plants.

7. The need to enhance the international system for OEF has been discussed in recent years, and this report suggests how the international OEF system existing today could be strengthened to improve its effectiveness.

8. This report focuses on systems that are operated by intergovernmental organizations with close contacts to national regulatory authorities. These systems provide an alternative network to the worldwide system employed by the operators of nuclear facilities known as the World Association of Nuclear Operators (WANO). The WANO system is restricted to its members, who have concluded that keeping the information exchanged confidential improves its usefulness. INSAG recognizes the merits of this approach, particularly in light of the primary responsibility of licensed operators for the safety of their facilities. Nevertheless, INSAG encourages WANO to share key safety lessons with national regulatory authorities and intergovernmental organizations.

1.2. OBJECTIVE

9. In developing the international OEF system and the process for its implementation, it is important to keep in mind the central purpose of OEF. Writing reports and collecting data are meaningful only when there is a direct coupling to risk reduction and the enhancement of operating safety. Therefore, event reporting needs to be connected to programmes that transform the lessons learned into risk reducing measures, such as improvements in design,

management of plant operations and ageing, operator training, operating procedures and safety culture. The OEF system should be improved both to provide a greater focus on corrective actions and to ensure the sharing of information on implementation of these actions. The international OEF system should be enhanced to provide information on good practices, and thereby to assist in facilitating the application of the lessons that have been learned by other facilities.

1.3. SCOPE AND IMPORTANCE OF OEF

10. As stated in INSAG-21, Strengthening the Global Nuclear Safety Regime [2], operating experience of general interest is not limited to events with direct impact on the operation of a facility, but also covers conditions, observations and new information of all kinds that could affect nuclear safety. The focus of OEF should therefore be shifted from mere reporting of safety significant events to a more comprehensive OEF system aimed at capturing even early signs of deterioration in safety. The key criterion should not be whether the safety event is significant, but rather whether the safety lesson is significant. An effective international OEF system should facilitate the sharing of experiences that have led to significant corrective actions in human performance, hardware or safety management practices, or have revealed vulnerabilities that are not yet fully incorporated into probabilistic risk assessment. In addition, the system should provide safety relevant information arising from research programmes, even if the concern was raised for reasons other than an incident at a nuclear facility.

11. Lessons on risks to nuclear facilities should be learned as well from other technical fields, although INSAG recognizes that these may be difficult to collect. For example, investigations conducted of accidents at other large and technically sophisticated facilities, such as power plants fired with fossil fuels or oil refineries, may provide useful insights for nuclear operators and regulators. This requires establishment of good communication among regulators working with different industries within each country, and vigilance by operators in the nuclear industry to recognize relevant hazards outside the nuclear industry. An improved international OEF system should share information on these hazards and related corrective measures.

12. New technologies, including advanced materials, passive safety features and computer based monitoring and control systems, are increasingly being used in new designs. It is necessary that experience with such new technologies

is shared worldwide in order to minimize, if not altogether to eliminate, unanticipated occurrences that may affect safety in an adverse manner.

13. The importance of OEF is enhanced as a result of the present worldwide trend to extend the operating life of nuclear power plants for significant periods beyond their initially declared design life. Consequently, an important objective for international OEF is to ensure that experience with ageing systems is widely shared so that all may learn of problems and intervene, as necessary, in a timely fashion.

14. Effective international OEF is useful not only to operators and regulators, but also to designers and vendors of nuclear facilities. The international OEF system should be extended so that the reported and accumulated information is made directly available to all who might benefit from it. OEF could play a major role in bringing about necessary improvements to design and operating procedures and to regulatory practices.

15. Several countries with no previous nuclear power experience are currently planning to start building nuclear power plants. These countries have no national database of experience, and a truly effective international OEF system must be in place to satisfy their needs.

16. Finally, it is appropriate to consider the OEF system in light of the obligation to preserve knowledge. In view of the long term importance of nuclear safety, the capture and preservation of operating experience information is of utmost importance to facilitate the transfer of knowledge and skills to the next generation. This requires a new and well organized database where the information of interest can be searched by properly arranged topics.

2. ROLE OF ORGANIZATIONS

2.1. NATIONAL ORGANIZATIONS

17. No international OEF system can function effectively without the active participation of relevant national organizations. Some networks provide a mechanism for communication among operators, whereas others are focused on the needs of regulators. Indeed, such participation is an inherent element of

the obligations to which Contracting Parties commit themselves upon signing the CNS. Active participation means two separate processes:

- Reporting to international parties on experience and on actions taken in response to this experience.
- Assessing the operating experience information received from the international system and taking actions, as necessary, based on lessons learned from this information. This process should include feedback to the international system whenever a decision is taken to act on the basis of information from another country.

18. In order to make these processes function properly, an adequate number of dedicated staff with clearly assigned tasks and work priorities is needed.

19. As noted above, the national organizations that need to be involved in the OEF system are the operators of the facilities and the regulatory bodies. In some countries these are supported by technical support organizations (TSOs) or other organizations with dedicated experts. Contributions from these experts should be channelled through the operating organization or the regulatory body in order to disseminate the information generated from research and analysis. The regulatory body should ensure that all parties carry out their duties with respect to disseminating and acting on OEF.

2.1.1. Reporting experience

20. The providers of the underlying operating experience information are the operators of facilities, but the most appropriate interface to the international OEF system can vary depending on the system. The responsibility for collecting national information, assessing its usefulness to international parties and reporting it to the international system should be clearly assigned to an appropriate organization, or organizations, in each country.

21. There should never be a reluctance to report information. INSAG recognizes that there may be incentives to conceal information because of perceived or actual consequences of reporting or perhaps because of apprehension that failures revealed to the international nuclear safety network may show the reporting country in a poor light. No regulator would tolerate a failure by a licensee to communicate with it for these reasons and each country should hold itself to the same standard. Everyone will benefit from a commitment to candour by all.

22. Reporting by different countries is quite uneven today and the guidance provided by the IAEA and OECD Nuclear Energy Agency (OECD/NEA), e.g. in the Incident Reporting System (IRS) Guidelines, is not followed to the degree to which it should be observed. Valuable experience is often not reported at all by some countries, or is not reported in a manner that enables others to receive the key messages in a timely fashion. More extensive reporting and more attention to the quality of the reports are needed to achieve the benefit of experience.

23. The main goal of each report written by national organizations for the international system should be to alert the recipients to risks not generally recognized before or not adequately addressed, and to provide advice on potential means for safety enhancement. Each report should describe the actions being planned or already taken to avoid the recurrence of a similar event at the reporting plant or to correct other deficiencies described in the report. Also, changes in the regulatory activities or regulations, if any, should be discussed. Finally, the value of reports would be enhanced if the reporting organization could provide recommendations on issues it considers worth a review and assessment by those receiving the report.

24. Submission of reports to the international system should be more timely than the current common practice. Reporting should not be delayed until all issues have been resolved and improvements implemented. It may often be practical to submit reports in stages, with submission of the first report as soon as the facts are known, to be followed by the submission of a complementary second report when the national assessment has been completed and a third when corrective actions have been determined and/or implemented. The reporting organization should also be ready to issue a revised report of improved clarity, as necessary, in response to comments and questions received from the international network.

2.1.2. Learning from others

25. INSAG's review of the current system would suggest that learning from the experience of other countries is not very effective. Although the data are limited, INSAG believes that only a few per cent of reports received from the international system lead to concrete actions in other countries. This may be due to the generally inadequate clarity of the received information, or perhaps to the lack of proper national processes for utilizing the experience of other countries. Another reason may be limited access to international information. A strong national system should be put in place to ensure that all experts with

duties relating to nuclear safety are provided with direct access to international reports, such as the reports from the IAEA–OECD/NEA IRS.

26. There are also examples of actions taken in some countries but not in others, although no clear reason for different responses is apparent. It is in the interest of each national regulatory body to investigate whether its national system is effective in obtaining information on experience from other countries and implementing the lessons arising from it.

27. Today only a few national organizations systematically report back to the international system about corrective actions taken in response to the experience reported from other countries. One reason is that there is no well defined international system within which to report such feedback. INSAG recommends that the national organizations write feedback reports and disseminate them, and encourage their foreign colleagues to undertake this effort as well.

2.2. INTERNATIONAL ORGANIZATIONS

28. International organizations are an essential part of the international OEF system. They have to be responsive to the needs of their member countries and make available systems that not only collect and disseminate information, but also assist in analysing and preserving the information. The role of international organizations is to ensure that the national organizations are advised to report the most important lessons for safety in high quality reports. They are also expected to coordinate production of reports that summarize lessons learned and give guidance for enhancing safety.

29. Among the international organizations, the IAEA is best positioned for collecting and transmitting information on worldwide operating experience and for providing guidance on OEF to national regulators and operators. Occasionally, such reports may also be useful to designers and vendors of nuclear facilities. Guidance as to how to develop OEF systems in Member States is available from materials published by the IAEA and OECD/NEA, and direct advice is provided through various safety service missions. INSAG encourages the IAEA and OECD/NEA to undertake further development of the IRS in order to make it more effective.

30. Another international organization with long term involvement in international OEF is the OECD/NEA. It has standing Technical Committees and

Working Groups consisting of high level experts from its Member States. The performance of these expert groups could be improved by asking them to strive for common conclusions and recommendations on effective responses to reported operational experience. These could include, in the short and medium term, proposals for improvements in plant safety features and safety management, or perhaps new or revised regulatory inspection practices. In order to maintain and improve safety in the longer term, these expert groups could propose additional areas for research and conduct periodic reassessments of safety.

31. As a separate activity, a number of topical database projects are operated by contracted organizations under the auspices of the OECD/NEA. Each of these databases is focused on a certain technical area, and the operation is entrusted to an expert organization working in that area. The national contact persons for each topical database are experts in the respective area.

2.2.1. Enhancing the IRS

32. The most important tool for gathering and sharing information is the IRS, which has been jointly developed by the IAEA and OECD/NEA and is currently managed by the IAEA. In its original form the IRS included information on events relating to nuclear power plants. Similar systems are used for events relating to research reactors, reported to the Incident Reporting System for Research Reactors (IRSRR), and for events relating to fuel cycle installations, reported to the Fuel Incident Notification and Analysis System (FINAS).

33. The main function of the IRS has been to share information on events of safety significance and on related lessons learned on a worldwide basis. This function was significantly improved in 2006 by the introduction of a web based system that allows for fast and easy distribution of information to all registered members. It also includes a comprehensive repository of reports. The usefulness of the IRS could be further enhanced with better guidance and new processes added to the current system. Several projects have been initiated to this end, but a significant increase in national and international resources is needed for their successful implementation, as well as for the operation of the extended system. To achieve this, the Member States should give strong support for the enhancement of the IRS.

34. In order to enhance the scope and effectiveness of the IRS, the IAEA, together with the OECD/NEA, initiated in August 2007 a revision of the IRS

Guidelines that were issued in 1998. In the revised Guidelines it will be important to clarify and strengthen the reporting criteria, and to make clear that the most important objective is to learn and transmit lessons for safety enhancement. Although reporting criteria are established in the original IRS Guidelines, selection of the events reported to the IRS is subject to the judgement of individual national organizations. Many countries have limited their reporting to ‘safety significant events’, and therefore low level events or near misses have generally not been reported to the IRS, even if they might in some cases be useful for learning lessons. Further, it is necessary to understand that the system is not restricted to reporting events only. Other experiences, including those involving organizational, training, management and safety culture issues, as well as new information of safety significance generated from research, testing or analysis, should also be included.

35. Useful guidance available in existing IAEA technical publications could be better incorporated into the IRS Guidelines. The revised Guidelines should stress the shift in the focus of the IRS from mere reporting of safety significant events to a more comprehensive OEF system. A second topic to be emphasized in the revised IRS Guidelines is that the main focus of the reports should not only be the technical details of the event or experience. Rather, it is more important to discuss root causes with common relevance, as well as the possible weaknesses and failures identified in the safety management processes.

36. In revising the guidance on the reporting of root causes, it is appropriate to recognize that it is often possible to find common elements in technical and in management related causes. People have a general tendency to make similar kinds of mistakes, and therefore the causes of an event tend to fall into a few general categories that are not dependent on the specific technology of the reactor. Among the root causes of events are: general weaknesses in the design process; incompatibility of materials; ageing effects; misunderstanding of phenomena; inappropriate inspections; insufficient communication; and ambiguous accountability and responsibility. Societal factors can also be important root causes for some events; societal pressures can affect relations among operators, regulators and the general public and can influence the management of nuclear operations. Societal effects should be included in the framework of OEF, together with various technical matters. Occasionally, the pressure of production — real or perceived — can be the root cause of events or the degradation of safety systems. Clear references to general root cause categories could facilitate the utilization of such information.

37. New features should be added to the IRS to promote its capabilities as a strong feedback system, rather than simply a means for one way reporting. These features are:

- A mechanism for the submission of questions and receipt of answers, thereby enabling better understanding of the reported information;
- Feedback reporting that provides information on measures that the recipients of the IRS reports have taken in response to reports received.

38. In spite of the guidance provided in the IRS Guidelines, the actual quality of the reports sent by some countries to the IRS has been uneven and sometimes the usefulness of the information has been questionable. Recently, the IAEA established an Event Review Group (ERG) to review event reports for completeness, accuracy and consistency. A common observation is that sometimes the IRS reports do not provide all the information that is needed by readers in other countries to understand the concerns presented, their root causes, or the corrective actions taken. Often answers to questions are neither submitted nor received or are inadequate. In order to correct this situation, a disciplined process for feedback should be developed within the national and international framework and added to the IRS. Adequate resources should be made available to facilitate productive interactions between the national organizations sending the reports and the readers in other countries.

39. Today there is no explicitly specified feedback process by which the recipients of the original report can provide information on the measures they have taken as a result of the report. Such measures might include detailed analyses and investigations, new regulatory requirements, or modifications in the hardware or operating practices of the nuclear facilities. The national coordinators of the IRS should have a clearly assigned responsibility to report back on the measures that were taken in their countries as a result of each original report. Likewise, they should have the responsibility to provide descriptions of good practices that are being put in place to prevent similar events from occurring. The IRS should incorporate arrangements for the collection, analysis and dissemination of the feedback and good practices reports, including summarization of the feedback information. These summaries should be made available to all IRS users in a common database.

2.2.2. Summary reports

40. The IAEA and the OECD/NEA have jointly published three summary reports ('Blue Books') on nuclear power plant operating experience covering

the periods: 1996–1999, 1999–2002 and 2002–2005. In addition, separate topical reports or topical studies have been written on some safety issues that are of general concern. Most of the summary information has been extracted from the IRS reports, but other sources have also been used.

41. The summary reports provide an overview of selected safety issues to enlighten senior managers in regulatory bodies and industry on potential risks and the means for addressing them.

42. The summary reports have been received favourably by all parties, and similar booklets should be issued in the future. Adequate resources and a commitment to writing high quality reports should be ensured.

2.2.3. Topical database projects

43. A good start has been made in the direct exchange of experience between experts working in the same topical areas. There is an aim to develop and make efficient use of databases dedicated to specific nuclear safety issues.

44. The largest topical database is the Information System on Occupational Exposure (ISOE). It was started by the OECD/NEA and is now co-sponsored by the IAEA. It is now well established and provides useful information and guidance on the means to reduce occupational radiation doses.

45. Other topical database projects are in various stages of early development under the umbrella of the OECD/NEA. These focus on rare events in specific areas for which there are not enough data in any one country to allow meaningful trending or statistical assessments. Thus, it is valuable to pool the data from as many countries as possible. The database projects comprise:

- ICDE: International Common-Cause Failure Data Exchange;
- FIRE: Fire Incident Records Exchange;
- OPDE: Piping Failure Data Exchange;
- COMPSIS: Exchange of Operating Experience Concerning Computer-based Systems Important to Safety;
- SCAP: Stress Corrosion Cracking and Cable Ageing.

46. Each database project is operated by a dedicated expert organization, and data are provided by experts from the member organizations and countries that jointly finance the project. The direct involvement of experts in the topics

ensures the quality and consistency of the data and promotes the use of information in participating organizations.

47. With the exception of ISOE, the number of countries that participate in the topical database projects is limited and proprietary restrictions on the deposited data limit the use of information. More extensive utilization of the respective databases and more open reporting of technical details are necessary to increase the usefulness of this exchange. INSAG encourages greater transparency in these efforts.

2.2.4. Documentation and knowledge management

48. INSAG has observed that certain issues are sometimes seen as new issues by less experienced nuclear professionals, although the issues were properly addressed and thoroughly studied in the past. This indicates the importance of making OEF information and research results readily available to coming generations.

49. Currently, there is no worldwide agreement on how operating experience information should be organized so as to preserve it and facilitate its efficient use in the future. Reports written and collected on separate events and observations, even if combined with efficient search engines, are difficult to utilize unless they are organized in a systematic way with user needs as a primary organizational factor.

50. In order to ensure proper knowledge management for the future, it is necessary to organize and store the accumulated operating experience in an easily retrievable manner. Such storage should serve as a collective memory of what has been learned about possible initiating events and contributing factors that could lead to a safety significant event, and of the means to reduce the identified risks.

51. One way of providing a sound basis for worldwide knowledge management would be a database that connects all relevant information with specified safety issues, including:

- Information relating to OEF;
- Good practices reported from the design, construction, operation and maintenance of nuclear facilities;
- Results of safety research;
- Regulatory review findings.

52. The aim should be to provide a central international repository of data relating to nuclear safety. Besides providing information on operating experience lessons for safety enhancement purposes in the short and medium term, such a database could also serve knowledge management purposes in the long term.

53. The database should be accessible to all key parties in the international operating experience system: designers, vendors, the research community, regulators, operators of nuclear facilities, and training organizations. INSAG is convinced that such a database would be a valuable tool.

54. A comprehensive list of safety issues should be developed, incorporating issues found to be important on the basis of operating experience or research. Useful lists of safety issues have been collected and documented by some national organizations and by some international working groups. These could serve as a start, but a new initiative should be taken to provide a common list of safety issues for the international database. New issues could be added later on as the need arises.

2.2.5. Coordination of international OEF

55. In order to provide adequate coordination of international OEF, it is necessary that countries with nuclear facilities agree on the creation of a high level advisory group or an equivalent mechanism. Such a group should guide and coordinate the work being done in different international organizations. Its membership should consist of persons who are committed to promoting international OEF and have a significant responsibility for decisions made on nuclear safety issues in their own countries.

56. Some operating experience is of a nature to justify internationally coordinated research or extensive analytical work, with the results and recommendations to be shared with all countries with nuclear facilities. The proposed international advisory group could define the tasks and coordinate this work. An example of effective international coordination of safety research is already provided by the Committee for Safety of Nuclear Installations (CSNI) of the OECD/NEA. Similar arrangements would be useful for guiding short or medium term actions that could result in immediate safety enhancements. An agreement may be needed in order to make this international activity truly effective.

3. CONCLUSIONS AND RECOMMENDATIONS

57. Current international OEF processes need to be further developed within the framework of the Global Nuclear Safety Regime. To achieve this objective, the international OEF system should be supported by an internationally agreed mechanism for coordination and guidance. A possible vehicle to address this need is a high level international advisory group of recognized experts.

58. Countries operating nuclear facilities should improve transparent sharing of information relating to nuclear safety, both nationally and internationally, consistent with the spirit of the CNS.

59. Increased resources need to be allocated, both nationally and to international organizations, to make international OEF systems more effective and efficient. This should result in more comprehensive reporting, in higher quality reports and in more effective utilization of the received reports.

60. A truly vibrant OEF system should not be limited to events, but also needs to cover conditions, observations and new information that could affect or aid in enhancing nuclear safety.

61. The emphasis should be shifted from collection and sharing of experience to the provision of guidance on additional safety analysis and possible safety enhancements. Such guidance could be provided by the proposed international advisory group.

62. Reporting on events and other safety relevant observations needs to be coupled with programmes that transform the lessons learned into risk reducing measures. The recipients of such reports, both operators and regulators, should close the feedback loop by providing information on their actions in response to a report. This information from recipients should be collected, summarized and made available to all potential users.

63. In order to facilitate the worldwide improvement of safety, the international nuclear community should increase transparency and enhance the exchange of information that is currently shared only within closed international expert groups that operate topical databases for the benefit of a limited number of participants, and justify this on the basis of commercial or proprietary considerations.

64. Efforts should be undertaken to learn lessons relevant to nuclear safety from regulators or industry in other fields. Relevant information from other fields should be provided to the international OEF system.

65. A knowledge management component should be built into the OEF system to ensure the maintenance of relevant nuclear safety information and to facilitate its transfer to future generations of nuclear professionals.

REFERENCES

- [1] Convention on Nuclear Safety, INFCIRC/449, IAEA, Vienna (1994).
- [2] INTERNATIONAL NUCLEAR SAFETY GROUP, Strengthening the Global Nuclear Safety Regime, INSAG-21, IAEA, Vienna (2006).
- [3] The IAEA/NEA INCIDENT REPORTING SYSTEM (IRS), IAEA, Vienna (2008).

MEMBERS OF THE INTERNATIONAL NUCLEAR SAFETY GROUP

Asmolov, V.	Lauvergeon, A. (Decobert, V., <i>delegated</i>)
Alonso, A.	Meserve, R.A. (<i>Chairman</i>)
Birkhofer, A.	Sharma, S.K.
Chang, N.	Rising, A.
Couto, A.	Slabber, J.
Drábová, D.	Suzuki, A.
Echávarri, L.E.	Torgerson, D.F.
Kang, C.S.	Weightman, M.
Laaksonen, J. (<i>Vice-Chairman</i>)	

PUBLICATIONS OF THE INTERNATIONAL NUCLEAR SAFETY GROUP

75-INSAG-1	Summary report on the post-accident review meeting on the Chernobyl accident	1986
75-INSAG-2	Radionuclide source terms from severe accidents to nuclear power plants with light water reactors	1987
75-INSAG-3	Basic safety principles for nuclear power plants	1988
75-INSAG-4	Safety culture	1991
75-INSAG-5	The safety of nuclear power	1992
75-INSAG-6	Probabilistic safety assessment	1992
75-INSAG-7	The Chernobyl accident: Updating of INSAG-1	1993
INSAG-8	A common basis for judging the safety of nuclear power plants built to earlier standards	1995
INSAG-9	Potential exposure in nuclear safety	1995
INSAG-10	Defence in depth in nuclear safety	1996
INSAG-11	The safe management of sources of radiation: Principles and strategies	1999
INSAG-12	Basic safety principles for nuclear power plants, 75-INSAG-3 Rev. 1	1999
INSAG-13	Management of operational safety in nuclear power plants	1999
INSAG-14	Safe management of the operating lifetimes of nuclear power plants	1999
INSAG-15	Key practical issues in strengthening safety culture	2002
INSAG-16	Maintaining knowledge, training and infrastructure for research and development in nuclear safety	2003
INSAG-17	Independence in regulatory decision making	2003
INSAG-18	Managing change in the nuclear industry: The effects on safety	2003
INSAG-19	Maintaining the design integrity of nuclear installations throughout their operating life	2003
INSAG-20	Stakeholder involvement in nuclear issues	2006
INSAG-21	Strengthening the Global Nuclear Safety Regime	2006
INSAG-22	Nuclear safety infrastructure for a national nuclear power programme supported by the IAEA Fundamental Safety Principles	2008

INTERNATIONAL ATOMIC ENERGY AGENCY
VIENNA
ISBN 978-92-0-108008-0
ISSN 1025-2169