

**Technical Meeting on
Global Cooperation on Generic Safety Issues
for Nuclear Power Plants and Measures for their Resolution,
10 - 12 December 2007,
BMU, Bonn**

1. BACKGROUND

In its 2007 work program the G8 Nuclear Safety and Security Group (NSSG) refers to the results of the IAEA International Conference "Effective Nuclear Regulatory Systems" held in Moscow, February/March 2006. "The Conference recognized the establishment and broader use of information networks and databases to enable regulatory bodies to have prompt access to the most current developments in areas of interest. In this context the Conference noted the increasing development of information and knowledge management networks to enhance the regulation of nuclear safety and security."

In its discussions regarding the Global Nuclear Safety Network, the NSSG concluded at its April 2007 meeting that co-operation should be enhanced on a voluntary basis and through existing structures and programmes.

The Heiligendamm G8 Summit Report (June 2007) stated, that the NSSG would "support the further enhancement of the evolving web-based systems and networks for information exchange and co-operation in nuclear safety matters, as implementation of nuclear conventions, co-operation on safety standards, and harmonization of safety approaches, exchange of operational experience and resolution of generic nuclear safety issues."

In this context, the IAEA hosted a Consultancy Meeting from 27-29 August 2007 in Vienna to review the current status and trends of nuclear safety networks, and to identify opportunities for better using the synergies among the networks to continuously enhance nuclear safety.

The consultancy meeting identified principles for network enhancement and actions, based on these principles for enhancing the GNSN. One of these actions was the initiative by Germany to host this Technical Meeting on Global Cooperation on Generic Safety Issues for Nuclear Power Plants and Measures for their Resolution. This meeting was held from 10-12 December 2007 in Bonn with participation of about 45 experts from European countries, Canada, Japan, Republic of Korea, USA, the European Union and the OECD/NEA. The objectives of this meeting, and the findings, insights, challenges and outlook resulting from this meeting are discussed in this report.

2. GENERIC SAFETY ISSUES

A generally accepted approach to characterize the safety concerns in nuclear power plants is to express them as safety issues which need to be resolved. When such safety issues are applicable to a generation of plants of a particular design or to a family of plants of a similar design, then they are termed generic safety issues (GSI). Examples of generic safety issues

are those related to pressure vessel integrity, pressure tube integrity, control rod insertion reliability or ECCS sump screen adequacy.

An effective global exchange of information on generic safety issues is considered to be one element of the Global Nuclear Safety Network (GNSN). The identification of generic safety issues, the compilation of related scientific-technical and regulatory information and of the resolution of such issues would therefore serve to enhance and strengthen the nuclear safety worldwide.

This approach of using generic safety issues for identifying and resolving safety concerns has been practiced in USA since the 70s (NUREG-0410 and NUREG-0933). Other Member States like France, Germany, Japan, Spain and Sweden also have experience in using similar approaches. In the 90s, the IAEA developed lists of generic safety issues for the WWER and RBMK NPPs. These were used as a reference to facilitate the development of plant specific safety improvement programmes and to serve as a basis for reviewing their implementation.

This approach was further extended. In 1998, the IAEA completed the IAEA-TECDOC-1044 entitled “Generic Safety Issues for Nuclear Power Plants with Light Water Reactors and Measures Taken for their Resolution” and established the associated LWRGSIDB database (Computer Manual Series No. 13). Subsequently, at their 1999 Annual Meeting, the Senior Regulators from Countries Operating CANDU Type Nuclear Power Plants decided that it would be useful to develop a document, along the lines of IAEA-TECDOC-1044, covering all the generic safety issues that apply to CANDU Type NPPs. This document has now been completed and is currently being published as IAEA-TECDOC-1554. The associated PHWRGSIDB database is also in the process of being established and tested. Each of these TECDOCs and databases basically contain a list of generic safety issues, on the basis of broad international experience, which could be used by the Member States as a reference in reassessing their operating plants. The applicability of these issues to each plant under review would, however, have to be checked on a case by case basis. It must also be pointed out that such a list of generic safety issues cannot ensure that all the possible safety concerns would be identified, since these would also be influenced by plant specific situations.

In this context, an agreed, up to date list of generic safety issues would be a useful element to organise and prioritise global nuclear safety co-operation. It would support planning and deciding on IAEA activities and performing such activities as for example assisting Member States in reassessing the safety of operating nuclear power plants. Other possible elements for such assistance are:

- Periodic Safety Review of Nuclear Power Plants, NS-G-2.10, 2003
(An IAEA Safety Guide which provides guidance on procedures)
- Evaluation of the Safety of Operating Nuclear Power Plants Built to Earlier Standards, A Common Basis for Judgement, Safety Reports Series No. 12, 1998
(An IAEA Safety Report which provides assistance for making expert judgments in the safety review process)

- A Common Basis for Judging the Safety of Nuclear Power Plants Built to Earlier Standards, INSAG-8, 1995
(An INSAG policy document)

It was originally envisaged that the TECDOCs and associated databases would be kept current as far possible on the basis of experience feedback provided by Member States from addressing and resolving the individual issues. This would enable individual Member States to utilize the information available in other Member States with respect to the identification and possible means of resolving individual issues. Since this would be an on-going process, a periodic updating of the databases on the basis of the accumulated knowledge base would be necessary. Unfortunately, contrary to the initial expectations, no feedback has yet been provided for IAEA-TECDOC-1044 and the associated database. In the case of IAEA-TECDOC-1554 and the associated database, it was decided that possible updates will be discussed at each Annual Meeting of CANDU Senior Regulators and that this will be used as a mechanism for providing feedback to the IAEA.

3. OBJECTIVES

The objectives of this meeting were to:

- a) Achieve a common understanding of current GSI approaches and practices;
- b) Create a common awareness of current practices benefits and chances for joint efforts;
- c) Discuss the appropriateness of GSIs to become a shared tool for a global nuclear safety network (GNSN); and
- d) Come to a common understanding of GNSN as a potential network for:
 - Co-operation and sharing of information on current safety issues;
 - Addressing significant findings from OEF, investigations, and research; and
 - Maintaining and improving knowledge.

4. KEY ASPECTS OF THE PRESENTATIONS AND DISCUSSIONS

The presentations showed that databases facilitate a more or less systematic identification, ranking and resolution of generic safety issues. However, it is necessary to further develop the understanding of GSIs.

The main sources for identifying and compiling generic safety issues are:

- Operating Experience Feedback (OEF);
- Findings from research;
- Findings from safety assessments;
- Insights gained from oversight process;
- Insights gained from PSA;
- Insights gained from the CNS review process;
- Insights gained from the use and application IAEA Safety Standards;
- Insights gained from IAEA Safety Services; and
- Insights gained from other international cooperation.

In this context, it is necessary to have a screening process using the following criteria based on national examples and adapted for the purposes of international cooperation:

- How do they affect public health and safety, defence in depth or the environment?
- Are they generic in nature (more than 2 installations)?
- Are they readily addressed by other programs?
- Can they be resolved by new or revised regulation or policy?
- Can the risk or safety significance be adequately determined?
- Are the individual issues well-defined?
- Would the resolution involve action by licensees?

An additional question that arose from the discussions was whether a lack of knowledge on the safety significance of the issue is a criterion.

There are different procedures for the prioritization of safety issues, depending on national practices. Examples of these are:

- Three to five levels in different countries;
- Two approaches i.e. deterministic and risk informed;
- Risk significance levels (risk matrices);
- Country-specific, dependent on the type of NPP and upgrading program.

The safety issues themselves can be categorized according to whether they are operational issues, design issues, cross-cutting issues or soft issues.

A clear closure criteria based on national requirements is required for every issue. The tracking of issues, e.g. partly closed issues or closed issues and the retention of information on them is essential from the perspective of knowledge management.

All the involved parties should have a common understanding of the safety significance of GSIs. An open and transparent exchange between the regulator and the operator/industry is also important. Another important item was the maintenance of openness and transparency while respecting confidentiality.

The status of the resolution of GSIs and the measures implemented for their resolution should be compiled in a databank and related information networks, open to the operator/industry and the public. This information should be reviewed by operators, industry as well as by regulators to learn lessons and to prevent recurrence of events. Any use of data from GSIs other than lessons learned needs to be based on confirmation by the data owner.

The maintenance and continuous updating of the database and of related information in other networks is important. A common database is needed for a comprehensive overview over all GSIs. Such a database should also contain basic information on each issue. Beyond this additional, more detailed information should be accessible in respective information networks. A systematic search function for the database and the related information networks is also essential. The owner of the database and of the related networks resources is responsible for the quality and content.

The OSART Methodology and the results of OSART Missions as related to

- Issues performance based: field review, observations
- Issues programme based: interviews, programme reviews (content and

availability of related documentation, procedures)

should systematically be evaluated with regard to contributions for operational generic safety issues

Guidelines for a systematic and structured approach to assess and solve GSIs should be developed.

5. GENERAL ITEMS TO BE CONSIDERED

On the basis of the presentations, some „or“-questions related to general items of GSI, and possible solutions for them, were discussed. The respective items and conclusions were:

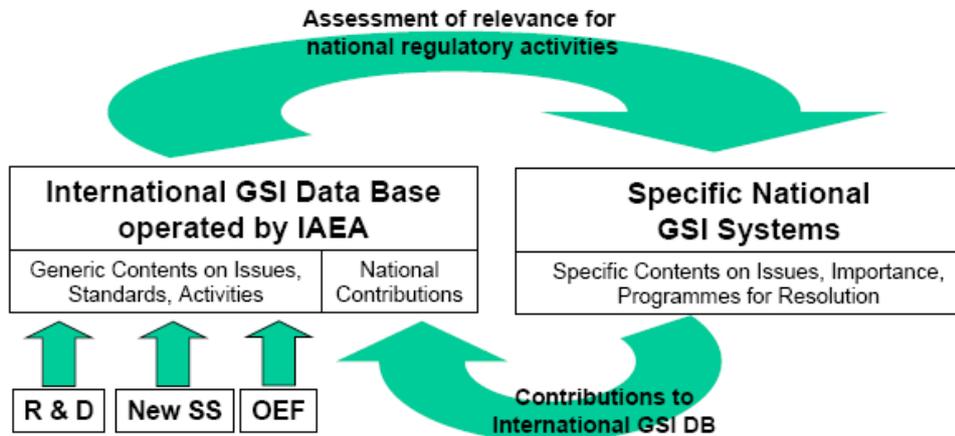
- Focus on knowledge management or GSI resolution?
=> Both, knowledge management should be the key-word of the whole subject.
- Wide scope or gradual scope?
=> more specific, realistic approach.
- Central site or multiple connections to sites of national and international actors?
=> centralized compilation of basic GSI information and decentralised access to more detailed information from national and international actors;
- Independence from other databases?
=> Net-working of existing databases and related information sources.
- Structured database or non-structured?
=> Google-search approach as an alternative to keywords.

6. INPUT FOR GNSN

Due to the large number of GSI databases and information sources, the net-working in an international context is the major challenge for the effectiveness of the global approach to GSIs. A key element in this context is a commitment of the countries on the one hand and the effective protection of databases against misuse/abuse on the other hand. It is also important to make the benefit clearly visible to all stakeholders.

A general flow chart of a Global GSI network is shown below:

Generic Safety Issues - synergistic approach



A great deal of effort has gone into creating and developing the existing elements of the GNSN. Today we have three levels of networks i.e. national, regional (example ANSN), and global, and these again in the areas of design, operation and R&D.

In order to get a complete overview, it is necessary to make all relevant databases and networks visible. The GNSN will have a large number of potential contributors. It is therefore essential to motivate the potential providers. To overcome language problems, strategies will have to be developed. The aim is to have at least abstracts/titles in English, even though the rest of the information can be in the original language.

The IAEA has compiled a list of the networks and information resources for the consultancy meeting mentioned in the Introduction. The IAEA activities are based on the IAEA safety standards. A suggestion of the TM is in this context that the Contracting Parties for the Convention Nuclear Safety should report during the Review Meeting:

- How they addressed the issues of the IAEA-report on major issues and trends in nuclear safety
- How, in this context, they take into account the available operating experience.

There is a common understanding that research for the resolution of GSIs is a key input for the definition of national regulatory research programmes. A global GSI approach would enhance effective exchange on open issues and related state of the art and research and would enable burden sharing by co-operation.

7. CHALLENGES

A main item for future activities in the field of GSIs is the commitment by member states to.

- Provide an overview of their information resources;
- Provide access to these information resources; and
- Ensure that these information resources are maintained and kept updated.

It was recognized that a central and focused support of GNSN activities is necessary and it is

expected that the G8 NSSG and the IAEA continue its support for the GNSN.

International co-operation for R&D and education and training as well as the establishment of an international knowledge base for GSIs is seen as an integral part of ensuring nuclear safety in the global context.

8. ADDED VALUES

The following items could provide added value:

- Synergistic effects of existing databases;
- Information on status and insights in other countries;
- Examples of interesting insights (hydrogen concentrations, sump clogging)
- What are the measures proposed for resolution of GSIs in other countries and what is the expected time needed for solution?
- Which issues are of importance in other countries (priorities)?

9. OUTLOOK

Further progress towards a global GSI network is achievable as the key elements, basic structures and information management tools needed for establishing and operating such a network are available.

A common international approach to GSIs is beneficial for the planning and prioritization of international nuclear safety co-operation, for harmonizing efforts for the resolution of current issues and for compiling and maintaining knowledge on the resolution of safety issues and on related regulatory approaches. The global GSI network therefore can be used as one beside other tools as an international management tool to ensure nuclear safety in a global context.

The IAEA's role in compiling GSI information for LWRs and CANDUs is well accepted by Member States. The recent progress with the CANDU GSIs is good basis for the next steps of the IAEA and Member States to consolidate the list of issues and the information compiled for each issue.

Objectives for such a consolidation of GSI information compiled by the IAEA can be:

- To maintain an up to date, commonly agreed overview over all nuclear safety issues that are important for ensuring nuclear safety in a global context;
- To support planning and communication of work programmes on reactors safety between international organisations and national actors;
- To support IAEA services on the safety of nuclear reactors;
- To integrate findings from IAEA services such as OSART missions;
- To review if safety issues and requirements for their resolution are adequately reflected in IAEA standards;
- To reflect insights gained from operational experience feedback for their relevance for generic issues and to track follow up actions in a global context.

To this end it would be helpful if guidelines for a systematic and structured approach to assess and co-operate on the resolution of GSI in a global context would be developed. These

guidelines should also address the relation between a centralised concise database and the more detailed, information delivered by other actors under their specific responsibilities.

For currently important safety issues such as the ECCS sump screen adequacy many different national and international efforts are under way leading to large amounts of important information on technical, scientific, design and operational and regulatory aspects of the issue. For such cases it would be helpful to create an international information – and knowledge network

Ongoing high level support such as by the G8 NSSG is a good opportunity for further progress with a Global GSI network. Concrete activities are foreseen by other fora of regulators or by supranational organisations such as EU institutions.

To maintain momentum and to promote further progress it would be very helpful if the topic GSI would be set on the agenda of senior regulators meetings and international conferences to be discussed in the context of other current issues such as closure of the operational experience feedback loop or maintenance of nuclear safety knowledge.