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NUCLEAR ENERGY AGENCY
COMMITTEE ON NUCLEAR REGULATORY ACTIVITIES

NEA/CNRA/R(2009)2
Unclassified

Current Status of the National Operating Experience Feedback Programmes

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English text only

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

The OECD is a unique forum where the governments of 30 democracies work together to address the economic, social and environmental challenges of globalisation. The OECD is also at the forefront of efforts to understand and to help governments respond to new developments and concerns, such as corporate governance, the information economy and the challenges of an ageing population. The Organisation provides a setting where governments can compare policy experiences, seek answers to common problems, identify good practice and work to co-ordinate domestic and international policies.

The OECD member countries are: Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, the Slovak Republic, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The Commission of the European Communities takes part in the work of the OECD.

OECD Publishing disseminates widely the results of the Organisation's statistics gathering and research on economic, social and environmental issues, as well as the conventions, guidelines and standards agreed by its members.

NUCLEAR ENERGY AGENCY

The OECD Nuclear Energy Agency (NEA) was established on 1st February 1958 under the name of the OEEC European Nuclear Energy Agency. It received its present designation on 20th April 1972, when Japan became its first non-European full member. NEA membership today consists of 28 OECD member countries: Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Luxembourg, Mexico, the Netherlands, Norway, Portugal, Republic of Korea, the Slovak Republic, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The Commission of the European Communities also takes part in the work of the Agency.

The mission of the NEA is:

- to assist its member countries in maintaining and further developing, through international co-operation, the scientific, technological and legal bases required for a safe, environmentally friendly and economical use of nuclear energy for peaceful purposes, as well as
- to provide authoritative assessments and to forge common understandings on key issues, as input to government decisions on nuclear energy policy and to broader OECD policy analyses in areas such as energy and sustainable development.

Specific areas of competence of the NEA include safety and regulation of nuclear activities, radioactive waste management, radiological protection, nuclear science, economic and technical analyses of the nuclear fuel cycle, nuclear law and liability, and public information.

The NEA Data Bank provides nuclear data and computer program services for participating countries. In these and related tasks, the NEA works in close collaboration with the International Atomic Energy Agency in Vienna, with which it has a Co-operation Agreement, as well as with other international organisations in the nuclear field.

Corrigenda to OECD publications may be found on line at: *www.oecd.org/publishing/corrigenda*.

COMMITTEE ON NUCLEAR REGULATORY ACTIVITIES

The Committee on Nuclear Regulatory Activities (CNRA) of the OECD Nuclear Energy Agency (NEA) is an international committee made up primarily of senior nuclear regulators. It was set up in 1989 as a forum for the exchange of information and experience among regulatory organisations.

The committee is responsible for the programme of the NEA, concerning the regulation, licensing and inspection of nuclear installations with regard to safety. The committee's purpose is to promote cooperation among member countries to feedback the experience to safety improving measures, enhance efficiency and effectiveness in the regulatory process and to maintain adequate infrastructure and competence in the nuclear safety field. The CNRA's main tasks are to review developments which could affect regulatory requirements with the objective of providing members with an understanding of the motivation for new regulatory requirements under consideration and an opportunity to offer suggestions that might improve them or avoid disparities among member countries. In particular, the committee reviews current management strategies and safety management practices and operating experiences at nuclear facilities with a view to disseminating lessons learned.

The committee focuses primarily on existing power reactors and other nuclear installations; it may also consider the regulatory implications of new designs of power reactors and other types of nuclear installations.

In implementing its programme, the CNRA establishes cooperative mechanisms with the Committee on the Safety of Nuclear Installations (CSNI) responsible for the programme of the Agency concerning the technical aspects of the design, construction and operation of nuclear installations. The committee also co-operates with NEA's Committee on Radiation Protection and Public Health (CRPPH) and NEA's Radioactive Waste Management Committee (RWMC) on matters of common interest.

FOREWORD

In 2008, WGOE issued a report entitled, "The Use of International Operating Experience Feedback for Improving Safety (NEA/CNRA/R(2008)3, January 2008)" (hereafter referred to as the "IOEF Report"). The IOEF Report considered effective National OEF systems to be a pre-requisite to effective IOEF and made three recommendations specific to national OEF systems:

1. "Given the necessary interfaces between national and internal systems, CNRA members should, as soon as possible, develop national OEF systems to meet best international practice (e.g. NS-G-2.11).

2. CNRA members should undertake to participate in international peer reviews (e.g. IRRS) and implement recommendations to enhance OEF.

3. WGOE should perform reviews every 2 years on the progress by the member countries in developing national OEF systems to meet the best international practice and from the results of international peer reviews."

In order to capture the current situation, members of the WGOE IOEF Task Group provided short narratives outlining their national OEF practices. The IOEF Report notes that, in order to get a comprehensive picture, these descriptions would have to be supplemented by those from other member countries. To facilitate further benchmarking of national OEF practices, WGOE developed a template for reporting, based on IAEA NS-G-2.11, in which all member countries were requested to provide their national information.

The result is this report, which provides descriptions of the different regulatory operating experience feedback programmes in the OECD member countries and non-Member countries as of 31 December 2008. The following countries have contributed to this report: Canada, Czech Republic, Finland, France, Germany, Japan, Mexico, The Netherlands, Slovak Republic, Slovenia, Sweden, Switzerland, United Kingdom and United States. While the compilation is not complete, it provides insights into the how data is collected, screened and used within these countries. It is important to note that the information contained in this report represents current practices in these countries as of ***31st December 2008***; there may be changes, for example, due to re-organisations, advancements, etc., which will be captured periodically on the OECD Web version of this report.

TABLE OF CONTENTS

FOREWORD 4
CHAPTER 1: GENERAL 7
CHAPTER 2: REPORTING OF EVENTS AT PLANTS 21
CHAPTER 3: SCREENING OF EVENTS 31
CHAPTER 4: INVESTIGATION OF EVENTS 43
CHAPTER 5: IN-DEPTH ANALYSIS 53
CHAPTER 6: CORRECTIVE ACTIONS 61
CHAPTER 7: TRENDING 65
CHAPTER 8: DISSEMINATION OF INFORMATION 71
CHAPTER 9: REGULATORY USE OF OPERATING EXPERIENCE FEEDBACK 77
CHAPTER 10: DOCUMENTATION / KNOWLEDGE MANAGEMENT 83
ANNEX 1: SUPPORTING INFORMATION 89

CHAPTER 1: GENERAL

Description of national strategies in monitoring operator OEF processes

Canada

The CNSC, the regulatory authority in Canada, conducts a multi-pronged assessment of the effectiveness of the utility's OEF processes involving various elements of the OPEX program. The assessment is conducted periodically, usually in concert with a wider review including the Corrective Action Program, at a frequency determined by the CNSC. On site, the CNSC's inspection team examines each OPEX process, including data collection, reporting, report screening, root cause analyses and the identification and disposition of corrective actions. The highlight of the inspection is to ensure lessons learned have actually been transmitted to the appropriate groups within the utility.

In parallel with the inspection effort, CNSC specialist staff from many disciplines perform desktop reviews of reported incidents to ensure compliance with the act, regulations, and safety performance standards. In addition to site inspection and desktop reviews, the CNSC dispatches Focussed Inspection Teams (FIT) to perform an independent assessment of certain high-profile incidents.

Czech Republic

There is one licensee (operator) with valid licenses for operation of nuclear power plants (NPPs), joint-stock company ČEZ, a.s. in the Czech Republic. Regulator responsible for regulation of nuclear safety, radiation protection and industrial safety at NPPs is State Office for Nuclear Safety (SONS/SÚJB).

Operator has implemented (I) OEF system based on requirements of Czech legislation, IAEA NS-G-2.11 and WANO practices/guidelines. SÚJB monitors operator's OEF process through regulatory inspections.

Requirements of Czech legislation, regulatory guides and international documents are further developed in Agreements between SÚJB and ČEZ, a.s. Agreements are signed e.g. for categorization of modifications and also for reporting of events and OEF process. Agreements are viewed as efficient tools for dealing with specific issues and as an intermediate step prior a regulation or a regulatory guide dealing with the topic is issued.

The main objective of SÚJB activities related to OEF at NPPs it to independently verify efficiency of licensee's OEF process, and to verify that operator is able to avoid recurrence of safety related events. Licensee's OEF system implemented to deal with safety relevant events at domestic NPPs is evaluated by SÚJB mainly during planned periodical regulatory inspections. If some more serious event occurs, reactive inspection is initiated.

When performing these inspections, adequacy of analysis, proposed corrective actions and status of ongoing corrective actions developed by operator's staff is reviewed. If deficiencies are found, necessary actions to correct these are required by inspection reports.

SÚJB is supported by contractors when performing OEF related activities. All safety relevant events are reviewed by contractors with the use of ASSET methodology. Selected events are analyzed with the use of risk precursor analysis methodology.

Wider trends are handled through relevant indicators from the set of safety indicators used by operator and regulator. Both regulator and operator have similar set of indicators developed based on the IAEA TEC-DOC-1141 and other relevant documents. Trends of indicators are presented at top level meetings between licensee and regulator and they are also published on SÚJB webpage. If negative trends occur, operator is expected to inform regulator on actions towards improvement.

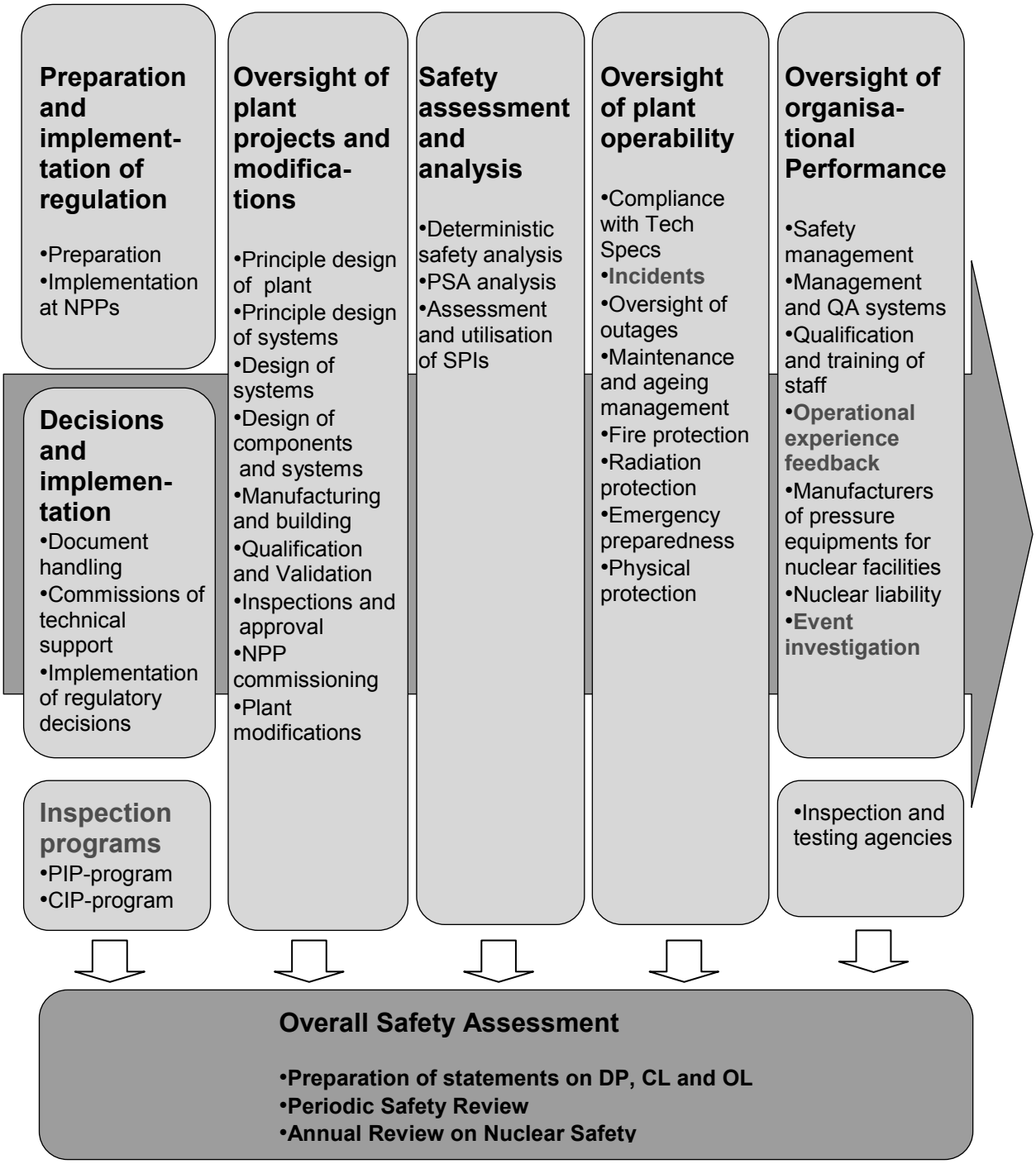
Finland

STUK - Radiation and Nuclear Safety Authority is a governmental organisation working administratively under the Ministry of Social Affairs and Health. However, *STUK* has also many connections with other ministries, such as the Ministry of Trade and Industry, Ministry of the Interior and Ministry for Foreign Affairs. Connections to ministries and governmental organisations are described in Chart 1 in Annex II. The establishment of *STUK* is based on the legislation (Act 1069/1983 and Decree 618/1997). *STUK* acts as the regulatory body for nuclear power plants in Finland.

According to the Decree *STUK* has the following duties:

- regulatory control of safety of the use of nuclear energy, emergency preparedness, physical security and nuclear materials
- regulatory control of the use of radiation and other radiation practices
- monitoring of the radiation situation in Finland, and maintaining of preparedness for abnormal radiation situations
- maintaining of national meteorological standards in the field
- research and development work for enhancing radiation and nuclear safety
- informing on radiation and nuclear safety issues, and participating in training activities in the field
- producing expert services in the field
- making proposals for developing the legislation in the field, and issuing general guides concerning radiation and nuclear safety
- participating in international co-operation in the field, and taking care of international control, contact or reporting activities as enacted or defined.

Regulatory Oversight of Nuclear Safety



The role, authority and responsibilities of *STUK* are defined in the Nuclear Energy and Radiation Protection Acts. Based on the legislation, *STUK* is independent in its decision-making process.

The responsibilities and rights of *STUK*, as regards the regulation of the use of nuclear energy, are provided in the Nuclear Energy Act. They cover the safety review and assessment of license applications, and the regulatory control of the construction and operation of a nuclear facility. Based on the Nuclear Energy Act, *STUK* has comprehensive regulatory control rights (e.g. access to documents and plants, right to make measurements and to take samples). *STUK* has the authority to enforce regulations, if necessary, with conditional imposition of a fine. Nuclear crimes are dealt with by the public prosecutor. Sanctions include fines and imprisonment up to 10 years. A legal mechanism exists in Finland for appeal of decisions made by public authorities.

STUK maintains jurisdiction over nuclear safety, radiation protection, pressure vessel, and nuclear material and safeguards. Nuclear Energy and Radiation Protection Acts and Decrees define the regulatory framework in Finland. General safety requirements are given by Decisions by the State Council (i.e., Cabinet of Ministers).

STUK gives detailed technical and administrative instructions relative to the design, construction, commissioning and operation of nuclear power plants in "YVL" Guides. These include; general guides, systems, pressure vessels, buildings, other structures and components, nuclear materials radiation protection and radioactive waste. In addition to the YVL Guides, *STUK* has internal guides (YTV Guides) which define inspection related practices.

At 1st January 2009 the total number of STUK's personnel was approximately 350. Of this number 104 working at the department of Nuclear Reactor Regulation: 95 technical or professional staff and 9 administrative staff.

Finland has 2 licensed sites, where are located 4 operating nuclear power plant units: 2 units per site. In addition at the other exciting site there is on unit under construction. At both sites Environmental Impact Assessment has been completed for one more unit. A new licensee has completed Environmental Impact Assessment on three alternative sites for a new plant with 1 or 2 units.

At Loviisa site there has been one resident inspector until the end of 2008: from the 1st January 2009 one inspector was recruited to be placed after half year's initiation training in Helsinki to Loviisa NPP as another resident inspector. At Olkiluto site there has been four resident inspectors since the mid of 2006 instead the previous two resident inspectors. The two additional inspectors were recruited to oversee the construction of the new unit at site.

Until the beginning of 2009 no-one was working full-timely on OEF at STUK. On 1st of January a person was recruited for operational experience feedback activities of Finnish operating plants. The bulk work of the Organisations and Operation division performing oversight of operating NPPs is related to OE/OEF (10 inspectors):

- day-to-day inspection activities by resident inspectors (one/plant site)
- reactive reviews and inspections due to operational events, poor performance etc.
- coordination and review of event reports by site dedicated Managers (2 inspectors) and other experts of NRR
- Safety Performance Indicators for NPPs (9 responsible persons & administrator)

- inspections of Periodic Inspection Programme, etc.

- Approximately 80 % of Investigation manager's work contribution is related to national and international OEF (review and assessment of Licensees' OEF-processes, event reports, IRS-reports, implementation of corrective actions; investigation of events, etc.).

Based on STUK's mission: protecting people, society, environment, and future generations from harmful effects of radiation, a general objective of the Nuclear Reactor Regulation department is to ensure that nuclear energy is used according to the regulations and decisions and that the use of nuclear energy does not cause any radiation harm to the health of the employees or the health of the public in the vicinity or any other damage to the environment or property. The most important safety objective in the use of nuclear energy is that there are no accidents or incidents that might hazard the safety in Finnish nuclear power plants. STUK supports the achieving of this objective through its regulatory control.

In the beginning of 1970's when the nuclear program in Finland was started a strong commitment to continuous improvement of safety was adopted. This principle is applied to all stakeholders and in all fields of nuclear safety: operational activities, modernisation and back-fitting of old plants, design of new facilities, and regulatory oversight. Operating events, both at the Finnish plants and abroad, are analyzed and actions for the continuous improvement of safety.

On present strategy period (2007-2011) international operating experience feedback has been taken as a special focus area: "International cooperation for learning lessons from experiences in nuclear power plant operation must be improved so that risks identified anywhere can be controlled efficiently everywhere. STUK actively participates in the development of a network and interaction between different countries and ensures on its own part that essential information is transmitted between nuclear power plants in Finland and other countries."

France

In France, there are 58 pressurised water reactors (PWR) used to generate electricity, together with the EPR reactor under construction. These 58 reactors, located on 19 sites, are all operated by a single licensee, Électricité de France (EDF). Another feature specific to France is the standardisation of the fleet, with a large number of technically similar reactors, justifying a "generic" presentation. One fast neutron reactor, used for research and producing electricity, is operated by CEA. Nine other research reactors are operated by CEA and one is operated by the Laue-Langevin Institute.

On behalf of the state, the role of ASN is to regulate nuclear safety and radiation protection in France, in order to protect workers, patients, the public and the environment from the risks linked to nuclear activities, and to contribute to informing the citizens. The total workforce of ASN as of 1st July 2008 was 435 persons, half based in central services and half in the regional divisions. Regulatory oversight by ASN is carried out with the support of the Institute for Radiation Protection and Nuclear Safety (IRSN) that has a total workforce of about 1600 people.

There are no onsite inspectors. In regional divisions, although each inspector is in charge of a specific site, he may also work on other sites, or on cross-cutting issues.

The French strategy in monitoring operator OEF processes is to check that the nuclear utilities operate their plants in an acceptable safe manner.

In ASN, OEF is treated at different steps :

- in regional divisions, each people in charge of a reactor's control plays a role in OEF checking events, …

This represents around 30 people. It is difficult to estimate the time spent on OEF for these people, around a few hours per week.

- in DCN (NPP Central service), 6 people, in addition to their own specific subjects, are also in charge of OEF. Every week, one of these 6 persons is in charge of OEF. This person is in charge of the "hotline" in order to support the regional divisions, and makes a weekly review of events, which may 1 day (per person /week).

In IRSN, more than 80 persons are directly or indirectly involved in the NPPs OEF. The people that have in charge the operating follow-up of a plant carry out the events analysis but other specialists like notably mechanical, Probabilistic Safety Assessment and fire experts are also concerned by this topic. In addition, OEF is an important basis for the safety assessments.

Germany

The first actors are the operators that maintain their OEF systems and exchanges information on events (reportable and non-reportable) and lessons learnt via their Nuclear Safety Officers and via the Central Incident Reporting and Evaluation Office of VGB Power Tech (VGB-ZMA). This office receives reports on lower level events, maintains common databases, ensures feedback to vendors (AREVA NP), liaises with the WANO reporting system, and generally facilitates international OEF. The second actors are the local regulators, the Länder regulators, who respond to event reports, assess the safety significance and the appropriateness of the licensee's countermeasures, supervise corrective actions, and review regular licensee's reports on OEF including human and organisational factors. The Länder regulators are supported by their TSOs that provide expertise on technical questions and supervise periodic testing and in-service inspections on site. The third actor is the federal regulator - supported by its Federal Agency BfS and its TSO GRS and other experts – that strengthens and monitors the overall performance of the OEF by reviewing all national reportable events, performing additional safety reviews in significant cases, issuing information notices on national or international events, and giving advice or issuing directives and guidelines to assure comparable high levels of protection against nuclear hazards. The Reactor Safety Commission (RSK), an advisory body of the federal regulator, receives regular reports of the licensees on reportable events and regularly holds deliberations on significant reportable events, thereby assisting the operators OEF processes. Via the Länder Committee for Nuclear Energy (LAA) the federal and Länder regulators can exchange information on and harmonize their approach to OEF.

Germany is a federal republic. Unless specified otherwise, on behalf of the federal government the execution of federal laws, like the Atomic Energy Act (AtG), lies in principle within the responsibility of the federal states, the Länder. The federal government supervises the Länder governments and may issue directives or sent commissioners to the Länder authorities. The regulatory authorities are the responsible ministries as laid down in an organisational decree of the respective government. Their mandate is derived directly from their duties according to the law.

The federal regulator has about 20-30 scientific staff members who work on federal supervision or national and international regulatory tasks. Moreover, the BfS has about the same number of scientific staff members who support the federal regulator in this field. Additionally, each year GRS experts support the federal regulator with about 20 man-years work on events and occurrences and perform further investigations into generic safety issues. The federal regulator is responsible for the 17 NPPs in operation,

altogether 17 plants in the decommissioning phase, and research reactors. The Länder regulators that perform the supervision of German plants calculate a work load of approximately 30 to 40 man-years per unit and year for their staff and their technical experts, e.g. the Land Baden-Württemberg has about 40 technical staff, supervising 4 units in operation, and uses annually about 125 man-years in support of its TSOs. While there are no resident inspectors, the Länder regulators have dedicated site inspectors. These aim to be on-site a least once a week. Moreover, the technical experts from the TSOs support the inspection programmes with on-site fact finding and initial assessments. Since there is no firm organisational separation between supervisory work and work on OEF, no data concerning the work spent on OEF are available as of 2008.

In the past, the strategy for the monitoring of the operators' OEF processes has been based mainly on reportable events. In the course of time, there have been additional regulatory decisions (licensing or supervisory) for the individual plants and additional agreements between regulators and licensees on OEF processes regarding regular reporting on operating experience. Thus, the German strategy for the monitoring of the operators' OEF processes works on multiple levels and ensures that accident prevention is strengthened by continuous learning and improvement.

Japan

(1) NISA Mission

The Nuclear and Industrial Safety Agency (NISA) was established on January 6, 2001 as part of a reorganization of central government ministries. NISA mission is to ensure the safety of the people's livelihoods through the regulation of the energy industry and related industries.

(2) Code of Conduct

Code of conduct of the NISA is "a strong sense of mission", "scientific and rational judgments", "transparency in its operations" and "neutrality and justice". (More explanation could be seen on its website: http://www.nisa.meti.go.jp/english/index.htm)

(3) OEF Process Monitoring Strategy

The purpose of OEF is to increase the reliability of the nuclear facilities for safe operation. So, regulatory agency oversights the operators OEF process that the lessons learned are well investigated and that the corrective actions are sufficient to prevent the recurrence and fed back to other similar facilities.

(4) Regulators

About 350 regulators are engaged with nuclear related facilities in NISA and about 450 employees of JNES are contributing to the nuclear regulatory activities. More than 100 employees are working for the inspections of nuclear facilities sharing the inspection tasks with NISA. Among them, almost 20 peoples are engaged with OEF and the total working times are estimated to around 10 Man-Year.

NISA has 20 local onsite inspectors offices in Japan. 15 offices are for the NPPs.

(5) Nuclear Power Plants

There are 55 operating Nuclear Power Plants in 17 sites and operated by 10 Nuclear Power Generating Companies in Japan. They provide about 30% of power supply in Japan.

Mexico

The National Commission on Nuclear Safety and Safeguards (CNSNS in Spanish) is Mexico's nuclear regulatory body. The operator is the state owned Laguna Verde Nuclear Power Plant (LVNPS) managed by the Federal Commission of Electricity (CFE in Spanish). There is only one nuclear power plant with two reactors of the Boiling Water Reactor (BWR) type, operating in Mexico. The national strategy in monitoring operator OEF processes involves the evaluation of reportable events sent by the operator, carrying out special investigations of specific events that are most relevant for safety, and carrying out annually inspections to the Operating Experience Program and Corrective Actions Program of the operator. The regulatory body takes part in the "Incident Reporting System" – IRS of the IAEA/NEA, in order to share operational experience of the Mexican nuclear installation with member countries in the international community, as well as gather and implement the experience of others in Mexico. The operator takes part in the WANO programs related to the OEF processes.

The Netherlands

The mandate of the Dutch regulatory body (KFD + RB/SNB) is a derivative of the mandate of the Minister of Environmental Affairs up to and including the shutting down of facilities in case of continued unsafe operation or continued non-compliance.

The scope of work includes NPP's, research reactors, irradiators, radioactive waste storage and handling facilities, accelerators, radiological laboratories, enrichment facilities, radioactive sources and transports.

The regulatory staff counts approximately 30 persons of which approximately 25 are professionals. The Netherlands has one operational NPP and one NPP that has been permanently shut down since 1997 and has been partially dismantled. There are eight other nuclear installations in the Netherlands. The total number of sites is six, including the two sites for the operational and partially dismantled NPP.

Due to the size of the Netherlands we only have installation-dedicated inspectors and no resident site inspectors. Approximately 7 persons work on OEF. The amount of time spent on OEF is about 1 fte (full time equivalent) per year.

The model in Annex II of IAEA Safety Guide NS-G-2.11 (page 55) describes the elements of the strategy and the system for operator and regulator OEF processes in place in the Netherlands.

Slovak Republic

The mandate of the UJD SR is:

To perform the state supervision upon the nuclear safety of nuclear installations with the objective to use the nuclear energy in Slovakia in such a way that no threat will jeopardize the public health, property and environment

The regulatory authority ensures that the public health and safety are protected in different peaceful uses of nuclear energy and that the nuclear installations in Slovakia are safe and well regulated

The office makes efforts to assure these conditions in a full extent.

The total number of employees of the UJD SR (regulatory body) is about 80. Nuclear Facilities in the Slovak Republic include Bohunice NPP and Mochovce NPP. The Bohunice NPP operates 2 units and 2

units are in stage of decommissioning and the Mochovce NPP operates 2 units and 2 units are under construction.

3 c. UJD SR has 5 site inspectors and has a specific group of OEF experts - Events Analysis Group with 10 to 12 employees, but only 2 work on full time. Remaining employees (from 8 to 10) do not participate on full time.

National strategy in monitoring operator OEF processes is required and based on the Regulation No. 50/2006 Coll. of the on details concerning the nuclear safety requirements for nuclear installations in respect of their siting, design, construction, commissioning, operation, decommissioning and closure of repository, as well as criteria for categorisation of classified equipment into safety classes

"Attachment No. 4, part B, letter I. Feedback from operational experience

1. Permit holders shall immediately adopt suitable corrective measures arising out of the results investigation of operating events. Permit holders shall demonstrably inform employees of the results of investigations and corrective measures.

2. Permit holders shall create systems for the assessment and application of information obtained from operational experience at other nuclear installations.

3. The results of assessment of information obtained pursuant to paragraph 2 shall be incorporated by permit holders into their own systems of activities as prevention of any operating events.

4. Permit holders shall create systems to provide employees with the appropriate level of reporting on all events with a potential impact on nuclear safety."

Slovenia

The Slovenian Nuclear Safety Administration (SNSA) has 47 fulltime employees. The scope of competence includes carrying out administrative and professional tasks to regulate and inspect:

- nuclear and radiological safety of nuclear facilities, nuclear trade, transport and handling of nuclear and radioactive materials, accountability and control of nuclear materials,
- physical protection of nuclear facilities and nuclear materials liability for nuclear damage, professional qualifications of personnel operating nuclear facilities and their training,
- quality assurance in nuclear field,
- radiological monitoring of the environment within the facilities.
- SNSA tasks include also:
- radiological monitoring of the environment.
- early notification in case of nuclear or radiological accidents, and
- international co-operation in the field of competence.

- Slovenian Nuclear Safety Administration (SNSA) is a regulatory body with a mission to assure that:

- harmful effects of ionising radiation to workers, population and environment are prevented or mitigated

- use of nuclear energy is for peaceful purposes only.

SNSA operates with a vision of high degree of radiation and nuclear safety, minimal radiation burdening of humans and environment, and use of sources of ionising radiation for peaceful purposes.

In Slovenia there is a single NPP unit on a single NPP/site, NPP Krsko. There are no onsite SNSA inspectors during NPP on-power operation (but there are 1 to 2 inspections per week). During an outage, one inspector and one additional SNSA employee are permanently onsite (while other inspectors and SNSA employees and TSOs are present during that time in accordance with the predetermined plan of the outage regulatory supervision and on an as needed basis).

SNSA does not have any dedicated full time OEF personnel. Actually used resources can be estimated at approx. 2.5 man-years per year (including IOEF, international regulatory experiences, OEF related international cooperation etc). NPP has a dedicated Independent Safety Evaluation Group (ISEG) of 5+2 employees, whose main task is OEF (including IOEF). Other personnel is included in the OEF related work on an as needed basis.

Monitoring operator OEF processes:

- through inspection activities (one inspection per year is dedicated to the review of the licensee's OEF processes; OEF processes are also monitored through regular inspections as needed)

- through performance indicators' program

- by review of licensee's reports (on events, yearly licensee report etc.)

- by reviewing the quarterly System Health Reports

- by communications between licensee's and regulator's OEF group

Sweden

The Swedish strategy in monitoring the operators OEF processes is to check that the nuclear utilities operate their plants in an acceptable safe manner and to promote the work for nuclear safety.

Regulatory Authority

The Swedish Radiation Safety Authority is a managing authority under the Ministry of the Environment since 1 July 2008, with national collective responsibility within the areas of radiation protection and nuclear safety.

The authority, took over the responsibility and tasks from the Swedish Radiation Protection Institute and the Swedish Nuclear Power Inspectorate when these ceased to exist on 30 June 2008, works towards protecting people and the environment from the harmful effects of radiation, now and in the future. The task of protecting covers both you as a private person and as a professional.

Parliament and the government decide on the assignments and budget of the Swedish Radiation Safety Authority, but like other authorities, we make decisions independently on individual matters.

The Swedish Radiation Safety Authority has a budget of about 400 million Swedish Kronor a year. The work is financed by tax funds and fees.

The authority is led by the Director-General, Ann-Louise Eksborgs, who has been appointed by the government. There are 250 employees with a broad and varied range of competencies. Technicians, engineers, physicists, biologists, social scientists, information officers, chemists and lawyers work here.

Nuclear Facilities

There are 10 operating nuclear power reactors in Sweden; seven are boiling water reactors and three are pressurised water reactors. There are three PWR and one BWR at Ringhals (with a combined installed capacity of 3715 MWe), three BWR at Forsmark (3218 MWe) and three BWR at Oskarshamn (2320 MWe). In 2007, the 10 reactors produced 64.3 TWh, accounting for about 44.3 percent of Sweden's total electricity production in that year.

Swedish Radiation Safety Authority reviews licensees' operating experience feedback processes against legal requirements. These reviews are carried out using for example, targeted team inspections, routine inspections by site or specialist inspectors and review of event reports submitted by licensees (LERs). The inspections of the OPEX process, includes data collection, reporting, report screening, root cause analyses and the identification and disposition of corrective actions.

The regulatory body takes part in the "Incident Reporting System" – IRS of the IAEA/NEA, in order to share operational experience from the Swedish nuclear installation with member countries in the international community, as well as gather and implement the experience of others in Sweden. The operators take part in the WANO programs related to the OEF processes. They are also members of NOG (The Nordic Owner Group) and other industrial groups for experience feedback.

Inspection

Sweden doesn´t have onsite inspectors. At the regulatory body approximately 2 person years per year is spent on operating experience.

Switzerland

The Swiss Federal Nuclear Safety Inspectorate ENSI (former HSK) is the national nuclear regulatory body of Switzerland. The Swiss strategy in monitoring operator OEF processes is to check that the nuclear utilities operate their plants in an acceptable safe manner. There is a general obligation of the licence holder to backfit the installation to the extent necessary according to worldwide operating experience.

The Nuclear Energy Act stipulates that the licence holder is responsible for the safety of the installation. Some duties of licence holders concerning monitoring OEF are following ones:

- report to the regulatory authorities periodically on the condition and operation of the installation and immediately on reportable events;
- keep track of advances in science and technology and of operational experience at comparable installations;
- maintain complete records on the technical facilities and on operation, and revise the safety analysis report and security analysis report when necessary;

These supervisory authorities have the competences and duties to establish safety criteria and requirements taking into account experience (feedback) and the state of science and technology

The operators and also the Inspectorate collect operational experience from domestic and foreign NPPs. In some cases the analyses of particular operating experiences have resulted in important safety related backfitting or in modifications of Swiss NPPs.

In the Periodic Safety Review, which is formally required from all NPPs at least every 10 years, the plants have to assess their own operating experience as well as all important applicable external events in a summarised version. This review is also assessed by the Inspectorate in a report open to the public.

The safety evaluation by the Inspectorate takes into account the experiences and the state of science and technology. The result of the regulatory review and reassessment is documented in a safety evaluation report, which includes conclusions and, if necessary, proposals for licence conditions to be formulated in conjunction with the licence

In order to keep the responsibility with the operator, the ENSI refrains from a too prescriptive approach in regulation. Requirements on certain issues are stated in the Nuclear Energy Act and the corresponding ordinances. Regulatory guidelines specify details to the ordinances. In the daily regulatory work, e.g. after the detection of deviations during inspections, HSK requires the correction of the deviation, however the way how to correct it, is left to the NPP, as long as it complies with the overall requirement.

United Kingdom

In terms of regulatory mandate, the Nuclear Installations Act 1965 (as amended) and overarching Health and Safety at Work (HSW) etc Act 1974 and its relevant statutory provisions provide the legal basis for nuclear safety regulation in the UK. Licensees are required to justify safety during the design, construction, manufacture, commissioning, operation and decommissioning phases. The scope of work includes regulation of a range of licensees and sites (both operational and under decommissioning), including civil power reactors, fuel cycle, R&D and defence facilities.

The regulatory body consists of approximately 300 Full-Time Equivalent staff. Of this number, 162 are Nuclear Inspector grades; this represents a significant shortfall against our cadre of 192 for operational work demands and 228 to include Generic Design Assessment for two reactor designs.

The UK has 39 licensed sites comprising: NPP sites (operational) - 9, NPP sites (decommissioning) - 8, Fuel Cycle sites (operational) - 3, R&D - 5, Defence Related Sites - 7, Others – 7.

HSE/NII has site inspectors dedicated to a single site (as for operational NPPs) or to a number of sites in proportion to the nuclear hazard represented by the site. Site inspectors spend approximately 30% of their working time on site.

One FTE Nuclear Inspector and 1.5 Administrative Support Staff are dedicated to OEF. In addition, use is made of TSO support and other nuclear inspectors on an "as required" basis.

At site level - site inspectors use licensees OEF to inform their interventions.

There is a permissioning “goal-setting” legislative framework in place within the UK. HSE/NII reviews licensees’ operating experience feedback processes against legal requirements (see chapter 2) and national and international (for example, IAEA guidance) relevant good practice. These reviews are carried out using a range of regulatory interventions, such as targeted team inspections, routine inspections by site

or specialist inspectors and review of event reports submitted by licensees. HSE/NII makes decisions on regulatory priorities and allocation of resources at "Regulatory Review" meetings, which function progressively at all levels within the organisation.

HSE/NII also operates a process (see Figure below) which involves a systematic review of operating experience from a range of sources (for example, its own regulatory activity, licensee events and safety performance indicators, international events, new build vendors, non-nuclear etc.) in targeting its regulatory activity and in informing improvements in its regulatory performance ("Learning Organisation"). Furthermore, the UK nuclear industry has an Operating Experience Learning Group (OELG), which facilitates sharing of good operating experience practices from the nuclear and other industries, both nationally and internationally.

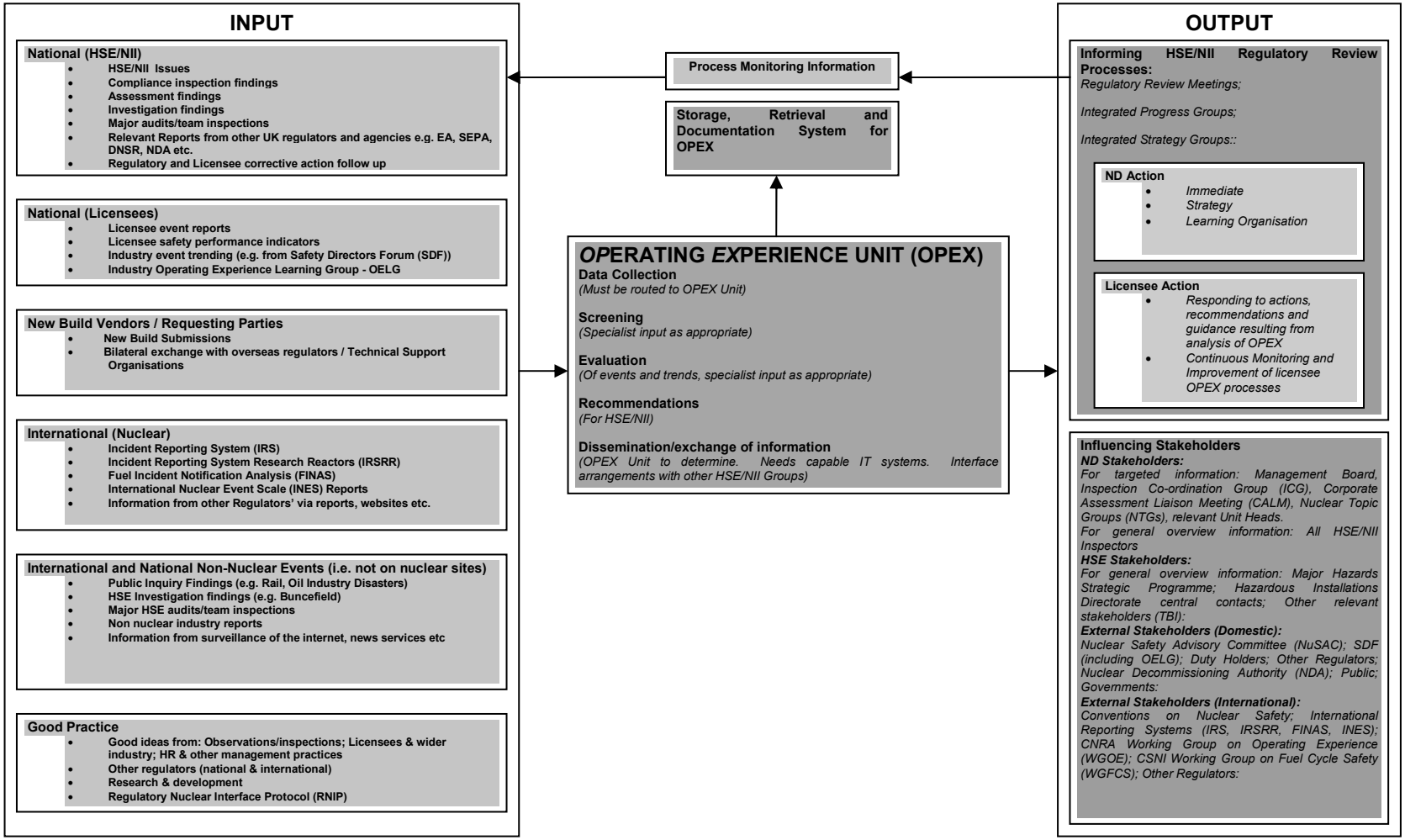
[Put HSE/ NII Model here from Annex 1]

United States

The mandate of the US NRC is based on the Atomic Energy Act of 1954, as Amended in NUREG-0980. NRC staff is approximately 5000 persons. The United States presently has 104 operating sites and the NRC does have onsite inspectors. 5 members of the staff are assigned to the (OEF) clearinghouse team.

The U.S. Nuclear Regulatory Commission (NRC) has a comprehensive and well-defined OEF process. The fundamental principles of the process are to collect, evaluate, communicate and apply operating experience information to achieve the NRC's principal safety mission: protect people and the environment.

HSE/NII MODEL FOR USE OF OPERATING EXPERIENCE FOR IMPROVING NUCLEAR SAFETY AND RADIOACTIVE WASTE MANAGEMENT



CHAPTER 2: REPORTING OF EVENTS AT PLANTS

Legislative basis and national requirements for OEF systems, including information on links with international systems and criteria for operator reporting

Canada

CNSC regulatory standard *Reporting Requirements for Operating Nuclear Power Plants* (S-99) went into effect on April 1, 2003, replacing a previous standard. The new standard was required because the legislative framework had changed with the coming into force of the Nuclear Safety and Control Act (NSCA). S-99 consolidates almost all legislated reporting requirements contained in the NSCA and its associated regulations that apply to Nuclear Power Plants (NPPs). The new standard also expands upon legislated general reporting requirements relating to NPPs. S-99 was incorporated into the operating licenses of all NPPs in 2003, making compliance with the document mandatory. S-99 is available at:

http://www.nuclearsafety.gc.ca/pubs_catalogue/uploads/S99en.pdf

Article 3. (b) of the NSCA calls for the implementation of measures respecting the international production and use of nuclear energy. Measures relevant to the OEF have been stipulated in the IAEA Safety Convention on which Canada is a signatory. Under the OEF provisions in the Safety Convention, the CNSC participates in and maintain links with the IAEA Incident Reporting System (IRS), the OECD/NEA and other bilateral agreements for international cooperation.

Czech Republic

Legally binding documents are acts and regulations in the Czech Republic. SÚJB has been also issuing a set of regulatory guides since 1980. The relevant requirements related to the OEF are contained in Annex 2.

Finland

Nuclear Energy Act (990/1987, amendment 7 a §, 23.5.2008/342) on Leading Principles for Nuclear Safety requires that: for further safety enhancement, actions shall be taken which can be regarded as justified considering operating experience and the results of safety research as well as the advancement of science and technology.

Nuclear Energy Decree (733/2008) replacing the former Government Decision (395/1991) took effect 1st December 2008. According to Section 24 of the Decree, operating experience from nuclear power plants shall be gathered and results of safety research shall be followed and these both shall be systematically assessed for further safety enhancement. Operational events which have, or may have, specific safety-significance shall be analysed to resolve root causes and to determine appropriate corrective actions which shall be implemented for the removal of root cause to prevent occurrence or recurrence of an

event. For further safety enhancement, actions shall be taken which can be regarded as justified based on principles of section 7a of Nuclear Energy Act, considering the results of safety research.

Detailed requirements to operators on management and on technical issues are given in STUK's regulatory guides, called YVL Guides. OEF is part of advanced quality system.

The Guide YVL 1.9 'Quality assurance during operation of NPP's' requires that procedures and plant arrangements for systematic analysis of operational events (own and abroad), clarification of root causes and carrying out of corrective actions shall be presented in the quality assurance programme.

The Guide YVL 1.11 'Nuclear power plant operating experience feedback' sets forth the criteria and requirements for licensee's OEF arrangements and procedures: organizing (resources, competence), processing, methods of analyses, recommendations, follow-up of corrective actions and measures. Operational events of plants' own and operational event reports from other nuclear facilities received from various sources shall be systematically processed applying these procedures.

In the regulatory Guide YVL 1.5 'Reporting nuclear facility operation to the Radiation and Nuclear Safety Authority' are given requirements and criteria on delivering notifications and reports to STUK on operating activities and operational events of nuclear facilities and also requirements on contents of these reports are presented. Purpose is to enable effective regulatory supervision.

Licensees have the instructions and criteria of their own for reporting on the operational events to STUK and WANO. Finnish NPPs have direct contacts with similar type of plants and nuclear reactor owners and users groups.

France

To be sure that the operating experience is used effectively to support the objective of safe operation, the French regulator requires from the operators:

- to have an appropriate organization permitting to collect and analyse operating experience information,
- to carry out analysis of root causes and, actual and potential consequences,
- to provide event minutes,
- to present corrective actions.

French legislative basis and national references are :

- state regulation : Articles 12 and 13 of the "quality" order of August 10th 1984 stipulate measures for anomalies and incidents. Any deviation from a requirement defined for the performance or result of a quality related activity, any situation liable to compromise the defined quality or any situation justifying corrective action with respect to safety, is referred to as an anomaly or an incident in the order. Anomalies or incidents which are important for safety must be identified. To this end, there must be a procedure for each quality-related activity to determine which anomalies or incidents must be considered as significant, on the basis of established criteria (see criteria in chapter 3).
- ASN letter concerning specific issues in the application of INES manual for rating events,

- ASN 2005 guideline : it describes the approach to be applied by licensee for reporting events to ASN, including criteria for classifying events.

The French context is very specific: one organisation operating a large number of identical or similar reactors. This context permits to have a considerable mass of consistent data, which is a huge advantage for OEF.

EDF examines the events reported by other operators and gathered in the WANO database as well as the IRS reports.

Besides, ASN and IRSN also exploit other international feedback sources such as:

- IRS reports,
- Information Notices and Regulatory Guides produced by the American Nuclear Regulatory Commission (NRC),
- events declared in the International Atomic Energy Agency (IAEA) NEWS database,
- information exchanged in the context of international co-operation.

Germany

Legislative Basis of the German OEF System

The following requirements concerning the German OEF system are legally binding:

- The Convention on Nuclear Safety defines in §19 requirements on OEF systems that Germany has fulfilled.
- Atomic Energy Act:
  - §12 authorises the federal government to issue an ordinance that regulates the reporting of safety significant deviations during construction and operation of a nuclear facility.
  - § 19 gives the regulator extensive enforcement and supervision powers.
- Ordinance on the Nuclear Safety Officer and the Reporting of Accidents and Other Events (AtSMV):
  - In §4 the position of the Nuclear Safety Officer (NSO) is defined. The NSO has to participate in the investigation of events of his plants (reportable and non-reportable alike), in the implementation of corrective actions from these investigations, and in the screening of reportable events in other German plants for relevance to his own plant. Additionally, he is responsible for the reporting of events to the regulator and facilitates the operating experience exchange with the NSO's of other plants.
  - In §§6 to 10 and annex 1 of the AtSMV the criteria for the reporting of events and the respective procedures are defined (see below). §7 (1) specifically requires the operator to

relate the causes and effects of reportable events and corrective actions taken or planned within the final event report.

Further requirements for the licensee's OEF system are found in guidelines and technical documents. These guidelines are not binding by themselves but only through binding decisions of the local regulator.

- The guideline on Safety Criteria for Nuclear Power Plants defines as a part of the fundamental requirements for safety that the operator has to securely monitor all operating states and that it shall record, evaluate and utilize operating experience.

- The guideline on Programmes for the Preservation of Technical Qualification of Responsible Shift Personnel at Nuclear Power Plants requires the operator to use operating experience (technical malfunctions as well as human faults) of its own plant and – if relevant – also of other plants in the training and requalification of shift personnel (i.e. shift safety engineer, shift supervisor, assistant shift supervisor, shift operator).

There is some additional guidance on OEF:

- The guideline on Fundamentals of Safety Management Systems in Nuclear Power Plants requires the licensees to implement in their plant a process based management system for safety. (The guideline is compatible with NS-G-2.4, INSAG-13 and EN ISO 9000:2000 pp.) Concerning OEF the guideline states in section 3.5.3 that the licensee shall implement processes to cope with insufficient process results. Therefore, faults and failures shall be analysed, trending shall be performed, and experience feedback shall be achieved. The personnel shall be encouraged to report their observation of degraded processes formally and informally. Finally, the guideline states that in planned intervals the safety management systems shall be audited internally as well as externally.

- The guideline on the Execution of Holistic Event Analyses, issued by the RSK in 2008, requires the licensee to perform the event analyses with sufficient profoundness and completeness in order to establish the causes of an event and derive appropriate corrective actions. Furthermore, the licensee is required to verify the implementation and efficiency of these actions.

- The guideline on the Procedure for Preparation and Execution of Maintenance and Modification Work in Nuclear Power Plants outlines the work flow for the treatment of incidents. Each incident has to be notified by the shift supervisor who then decides if the formal procedure of the operations manual has to be applied. If that is the case, the procedure requires an assessment of the incidents considering the safety significance of that incident and the urgency of corrective actions and the technical clarification of maintenance work. Moreover, the guideline defines the minimum of information in an initial report on incidents.

- The technical rule General Requirements Regarding Quality Assurance (KTA 1401) defines in section 3 that there shall be quality assurance measures for all relevant procedures in a plant. These measures shall be implemented in such a way that deficiencies in quality are detected and experience feedback is utilized in future work.

- The technical rule Requirements on the Operations Manual (KTA 1201) states that the criteria for the reporting of events shall be integrated into the operations manual.

Based on §17 and § 19 AtG the Länder regulators have added more detailed requirements to the licensees for the operation of nuclear power plants or struck further agreements with their licensees on OEF.

Reportable Events

Criteria and procedures for reportable events are laid down in the AtSMV. In §8 AtSMV four categories of events are defined. These categories particularly take into account the aspect that the regulator has to be able to take precautionary measures within an appropriate timeframe irrespective of the actual safety significance of the event.

- Category S: Events, which have to be reported immediately in order that the regulator is able to take immediate action.
- Category E: Events, which have to be reported within 24 hours.
- Category N: Events, which have to be reported within 5 days.
- Category V: Events during the construction of a plant (now obsolete).

In annex 1 of the AtSMV there are altogether about 80 criteria for the different categories. Those criteria mainly cover initiating events as well as precursors to initiating events, unplanned releases of radiation, and technical failures within the safety system. For all reportable events the licensee has to provide on an official form a description of the event, its detection, consequences, and adjustment, the causes of the event, and the measures taken against repetition. If the operator cannot produce the required information on an event within the time limits for reporting, it has to mark his report as preliminary and provide a final report later.

Links to International OEF Systems

The German operators have established their link to international OEF systems through the VGB office that facilitates the communication with WANO, with the OEF department of AREVA NP, and with plants of German design in other countries. Additionally, the Nuclear Safety Officers of each operator are required to keep up to date on international operating experience.

On the regulatory side, Germany takes part in all major international activities on OEF of IAEA and NEA. The federal authority has commissioned its TSO, GRS, to provide the INES and IRS officer for Germany. Moreover, GRS screens the international operating experience, e.g. from INES and IRS, with respect to their relevance for German plants and reports regularly to the federal authority.

Japan

When the incident or failure occurs in the nuclear facilities, the utility has to report it to the agency promptly according to the Law for the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors (Reactor Regulation Law). And also when the incident or failure of the major power generating systems or components occurs, the utility has to report it according to the Electricity Utilities Industry Law (EUIL).

The regulatory agency, NISA, makes press release about the incident with INES scale and require the utility to analyse the cause of the event and the countermeasures. The events with INES scale above level 2 are reported to IAEA and uploaded on "NEWS".

When NISA receive the utility's report with cause analysis and countermeasures, NISA reviews the report if it is acceptable. NISA require the other utilities to review if it is necessary to feed back to their plants.

Almost all of the reported events by the Reactor Regulation Law or the EUIL are reported to the international system, i.e., Incident Reporting System following the guideline.

In addition to the above, the deviation or the violation of the Operational Safety Program is also reported to the agency.

Mexico

The regulatory body and the operator have their own processes to carry out root cause analysis and there are legal requirements for the operator to execute these activities in a proper manner. The regulatory body is part of the Ministry of Energy and its Division of Nuclear Safety is in charge of the activities related to nuclear safety aspects of the nuclear installations; the Department of Evaluation is assigned to this Division, and within this, is the Area of Operating Experience (AOE) that reviews the managing of the External and Internal Operating Experience.

By External Operating Experience, it is understood: all that experience produced outside the License Condition 5 establishes that the operator must use Internal and External Operating Experience in order to keep safety standards at the highest levels. The main sources of information come from the United States Nuclear Regulatory Commission (USNRC), the Nuclear Energy Agency of the Organisation for Economic Co-operation and Development (NEA/OECD) and from the International Atomic Energy Agency (IAEA).

The Internal Operating Experience comes from events occurred at the nuclear installation LVNPS. In the case of the nuclear power plant, this information is compiled in a Immediate Notification Report, which in its format contains a summary of the event, the critical parameters (such as reactor power, pressure and temperature at the reactor vessel), the immediate corrective actions taken, the status of the emergency systems, and if applicable, the radiological conditions.

This report is sent directly to the resident inspector at the site and to the nuclear safety manager at the regulatory body headquarters and upon its evaluation by upper management it is decided whether it is or not necessary to carry out an Augmented Inspection to the site for the event investigation.

The reporting criteria for operational events are set in the regulation. Some examples are the following:

- Events related to unplanned reactor shutdown,
- Any violation to Technical Specifications,
- Any valid actuation of an emergency system or an engineered safety feature,
- Any condition which is out of the design bases.
- Contamination of areas above the regulatory limits

The Netherlands

The legislative basis for reporting events at plants is threefold: a. The Nuclear Energy Act has the IAEA Safety Series No. 50 Codes of Practices for Design and Operation as a basis; b. The license of each nuclear installation in the Netherlands contains explicit requirements for reporting of events and for keeping abreast of events worldwide at similar nuclear installations; c. The (Safety) Technical Specifications (VTS) of each nuclear installation contain the reporting requirements at three levels (immediate, within 8 hours, written report within 14 days; written report within 30 days and by periodic reporting of the nuclear installation)

Slovak Republic

Legislative basis and the national requirements for OEF systems including information on links with international systems and criteria for operator reporting is part of:

1. the Regulation No. 50/2006 Coll. of the on details concerning the nuclear safety requirements for nuclear installations in respect of their siting, design, construction, commissioning, operation, decommissioning and closure of repository, as well as criteria for categorisation of classified equipment into safety classes

2. the Regulation No. 48/2006 Coll. on details of notification of operational events and events during shipment, as well as details of investigation of their reasons

Slovenia

Licensee is required by law (ZVISJV-UPB2, art. 60) to have an active OEF system that includes also events at other (including international) nuclear facilities. Details regarding the OEF system are prescribed in regulation. The regulation is to be harmonized with WENRA harmonised OEF requirements before 2010, but all there specified requirements are already fulfilled by the licensee even though not explicitly required.

Requirements for event reporting are now the same as in the US, with some additional more detailed requirements. The regulation regarding event reporting is also in the process of harmonisation with WENRA requirements.

The licensee of Slovenian only NPP is a WANO member and reports events also to the WANO system.

Sweden

The framework of Sweden's nuclear and radiation protection regime is to be found in five acts:[1]

- the Nuclear Activities Act [SFS 1984:3], which concerns mainly security and control issues and the overall safety of nuclear operations;

- the Environmental Code [SFS 1998:808], which addresses environmental aspects of nuclear activities, and lists "nuclear activities" among several other "environmentally hazardous activities"

1. All Swedish acts are published in the Swedish Statute Book, herein referred to as "SFS".

- the Radiation Protection Act [SFS 1988:220], which aims to protect people, animals and the environment from the harmful effects of radiation;

- the Act on Financing of Management of Residual Products from Nuclear Activities [2006:647], which contains provisions for the future costs of spent fuel and nuclear waste disposal, decommissioning of reactors and other nuclear installations and research in the field of nuclear waste; and

- the Nuclear Liability Act [SFS 1968:45], which implements Sweden's obligations as a Party to the 1960 Paris Convention on Third Party Liability in the Field of Nuclear Energy and the 1963 Brussels Convention Supplementary to the Paris Convention.

Most aspects but radiation protection of Sweden's nuclear facilities are regulated by the Nuclear Activities Act [SFS 1984:3] (containing general provisions) and the Nuclear Activities Ordinance [SFS 1984:14] (containing more detailed rules).

The fundamental provisions of the act provide that nuclear activities are to be conducted in such a manner that all safety measures needed to prevent a radiological accident shall be taken [Section 3]. The act defines nuclear activities to include: the construction, possession and operation of a nuclear installation; the acquisition, possession, transfer, handling, processing, transport or other dealings with nuclear substances and nuclear waste; and the importation of nuclear substances and nuclear waste, and exportation of nuclear waste.

The regulatory body also has issued regulations and general recommendations for example The Swedish Nuclear Power Inspectorate's Regulatory Code 2004:1" which outline the general regulations. These are further described in Appendix 2.

Switzerland

The Nuclear Energy Act, the Nuclear Energy Ordinance and regulatory guidelines include requirements on the notification of events. Art. 37 Clause 1 and Appendix 3 Nuclear Energy Ordinance (KEV) define the reports to be submitted to the regulatory body for the purpose of assessing the status and operation of the facility. This includes also events below the notification level or similar operating experience. Events such as equipment failures, scrams and failed mandatory tests have to be reported within a fixed (short) period of time given by Appendix 6 of the KEV. The licensee is also obliged to review international event information available through different channels like WANO, IAEA, and supplier's information letters. The insights gained from these reviews have to be reported at least every three months. A set of safety indicators has been defined, to be updated and reported by the plants annually.

Such licensee reporting may result in regulatory requirements and/or recommendations for improvement. Moreover, the Inspectorate also reviews information on international events as well as insights from safety research. This review may also result in regulatory action and, as appropriate, in requirements and/or improvement recommendations to the operator.

United Kingdom

The Nuclear Installations Act 1965 (as amended) and overarching Health and Safety at Work (HSW) etc Act 1974 and its relevant statutory provisions provide the legal basis for nuclear safety regulation in the UK. Within this legislative framework, licensees have arrangements to show that the nuclear hazard on the site is being managed safely. The UK has a range of licensees and sites (both operational and under

decommissioning), including civil power reactors, fuel cycle, R&D and defence related facilities. Licences for all UK licensees have a standard set of 36 licence conditions covering various aspects of nuclear safety (http://www.hse.gov.uk/nuclear/saps/index.htm).

The need for licensees to review and learn from operating experience is an important part of UK regulation and is covered specifically by nuclear site licence condition 7 (incidents on the site) and Management of Health and Safety at Work Regulations (MHSWR) 1999 Regulation 5 (health and safety arrangements). In addition, the UK Nuclear installations Inspectorate (HSE/NII) has published Safety Assessment Principles (SAPs) for its inspectors to use together with Technical Assessment Guides to guide regulatory decision making in the nuclear permissioning process (http://www.hse.gov.uk/nuclear/saps/index.htm).

Licence Condition 7 requires licensees to make and implement adequate arrangements for notifying, recording, investigating and reporting of incidents on the site. MHSWR Regulation 5 requires investigation of the immediate and underlying causes of incidents and accidents to ensure that remedial action is taken, lessons are learned and that a periodic review is conducted of the safety management system. SAP MSP4 (leadership and management for safety) notes that lessons should be learned from internal and external sources to continually improve leadership, organisational capability, safety decision making and safety performance, IAEA Safety Guide NS-G-2.11 sets out international good practice for national OEF systems.

In line with LC7, MHSWR Regulation 5, SAP MSP4 and IAEA Safety Guide NS-G-2.11, HSE/NII expects licensees to:

- categorise events, all the way down to near misses, according to safety significance
- report significant events to the regulator, within timescales related to safety significance
- investigate incidents depending on actual or potential harm
- analyse trends and patterns for improvements.

Licensees' criteria for reporting of events to the regulator are contained within their Licence Condition 7 arrangements. These criteria include dangerous occurrences reportable under the Nuclear Installations (Dangerous Occurrences) Regulations 1965 involving: radiation exposure of individuals, significant effects on safe operation or condition of plant, breaches of legal requirements for disposal of radioactive waste, significant spillages of radioactive substances or releases to the environment. Licensees are also required to report incidents to HSE/NII under Ionising Radiations Regulations 1999 Regulation 25 and the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995. HSE/NII is currently developing guidance setting out its expectations for licensees' Licence Condition 7 arrangements.

HSE/NII operates the relevant international systems IRS, IRSRR and FINAS on behalf of the UK to meet the system guidelines and has an internal procedure which sets out its processes for contribution to and use of international OEF (IOEF) systems and associated IOEF Groups. In particular, HSE/NII:

- assesses the relevance of national and international events
- inputs relevant events to international systems

- screens and disseminates relevant information from IOEF systems internally to inform regulatory interventions (and improve regulatory performance) and to licensees, either directly or via the Industry OELG.

HSE/NII also operates the International Nuclear Events Scale (INES) system. All reportable events that occur at UK civil nuclear sites are rated against the INES scale and those events rated at 2 or above or identified as attracting public interest reported internationally via the Nuclear Events Web-based System (NEWS).

In addition to the IOEF and INES systems, HSE/NII reviews other international nuclear and non-nuclear sources for regulatory significance, including:

- bilateral exchanges with other regulators
- US NRC Information Notices
- lessons from major non-nuclear events.

There is no legal requirement for licensees to participate in international reporting. However, UK licensees, individually and via the Industry OELG, work closely with the HSE/NII to fulfil the UK's international reporting commitments. In addition, licensees review events gathered in the WANO database and share experiences with each other via the OELG.

United States

Title 10 of the United States Code of Federal Regulations (10 CFR) contains national requirements for OEF reporting. Specifically, 10 CFR Part 50.72 contains requirements for immediate and short-term reporting of events that occur at commercial nuclear power plants, while Part 50.73 outlines requirements for 60-day follow-up reports (Licensee Event Reports). In addition, 10 CFR Part 21 contains reporting requirements for Defects and Non-Compliances, wherein vendors in the supply chain must report on any defects discovered on components that are installed in nuclear power plants.

All reportable events that occur at U.S. commercial nuclear power plants are also rated against the International Nuclear Events Scale (INES). Events rated INES Level 2 or above are reported internationally via the Nuclear Events Web-based System (NEWS). The U.S. also shares reactor-related generic communications with the international community by posting them on the Web-Based Incident Reporting System database (WBIRS).

CHAPTER 3: SCREENING OF EVENTS

Information on how events are screened on the basis of safety significance, how the regulator investigates the operator's screening process to ensure screening is effective in identifying events for analysis and to gain insights for targeting regulatory programmes

Information on how national reports are screened for international use

Canada

S-99, the Canadian Nuclear Safety Commission's Regulatory Standard on Reporting Requirements for Operating Nuclear Power Plants (NPPs), establishes the reporting criteria for NPPs. All S-99 reportable events are screened by specialists groups within the CNSC in accordance with their criteria. For example, the Human and Organisation Performance Division (HOPD) screens events for Human Factors and Organization and Management issues.

Licensees also have their own process for screening events based on safety significance. CNSC staff review their process periodically for adequacy- both in terms of the program and its implementation- as part of the national strategy to monitor the licensee's OEF programs highlighted in Chapter 1 above.

Screening of events for international use is performed through a periodic review of the reported events in the CNSC's event database CERTS (Central Events Reporting and Tracking System). Events which meet the international reporting criteria particularly those involving lessons learned or important regulatory actions are selected for reporting.

Czech Republic

Philosophy of screening for further analysis is quite simple – all events from Appendix 3 to the above mentioned Agreement are further analyzed by licensee. As described above, investigation is legal duty of licensee.

SÚJB verifies fulfilment of this licensee's duty by regular regulatory inspections. If deficiencies in licensee's OEF process are found by these inspections, improvements are required by inspection reports.

Results of inspections focused on OEF are used similarly as all other inspections results. Content of inspection reports is analyzed by SÚJB internal board in monthly period. Relevant findings are used as inputs for inspection planning (reactive inspection can be initiated), for improvement of internal SÚJB procedures.

Screening of national reports for international use:

- SÚJB as a national IRS coordinator is responsible for screening events at domestic NPPs for IRS. According to the internal procedure, group of experts (SÚJB inspectors and managers, external contracted experts) decides, which of domestic events are reported to the IRS. IRS reporting guidelines are used, however, human and financial resources are limiting factor. Nevertheless, Czech Republic reports similar number of events as other countries.

Finland

In Guide YVL 1.11 licensees are given requirements for assessment and screening of operational events. Licensees have established their instructions and procedures to assess safety significance of operating events and to identify the necessary actions. Operational events are brought to the knowledge of the organisational unit responsible for providing feedback on them. Examples of such events are: deficiencies observed in plant safety functions, allocation of resources and procedures; emergencies and transients; erroneous modes of action; component and system failures; events which have had an impact on radiation safety.

If the result of licensee's initial assessment is that observation is not an operational event analyses is stopped. Otherwise observation is recorded and classified for analysis if further investigations are need or producing an Operational Event -report and recorded to event register.

The Guide YVL 1.5 "Reporting nuclear facility operation to the Radiation and Nuclear Safety Authority", presents what notifications and reports on the operation of nuclear facilities are required from the licensees and how they shall be delivered to STUK. Reports concerning the operation of nuclear facilities are divided into event specific and regular reports. Requirements for the contents and submission of the regular reports are presented in the Guide. Detailed criteria for compiling an event specific report (special report, disturbance report or other incident report) are presented as well.

Such events which do not require the preparation of a special or disturbance report may still be significant e.g. for the functioning of quality or environmental management systems, the recognition of safety deficiencies or training needs, industrial safety or the operability of the plant. Also close call - situations may be such events. Licensees' quality management systems require the handling and internal reporting of these kinds of events, too. The compiled report on the event shall be submitted to STUK for information, if the event has or may have significance to nuclear or radiation safety or STUK's communication activities. The report shall present essential information regarding the event, and it shall be a part of a report series of a licensee. This report can be used for the first reporting and presentation of the INES level, whereupon the report shall be submitted to STUK as soon as possible. Procedures concerning the notification of the INES level are presented in Guide YVL 1.12.

All reportable events shall be immediately notified to STUK's expert on duty (24 hours) by telephone and included in the next daily report. STUK's management and related experts are informed according a list in duty system procedures. Also such an event that may be suspected to create public interest shall be notified to STUK respectively.

STUK oversees and verifies the licensees' OEF processes and results as part of its regulatory oversight processes of nuclear safety and as part of its periodic inspection programs for operating NPP's (KTO) and for plants under construction (RTO). STUK has its own independent OEF processes for screening, review and assessment of operating experience information reported by Finnish NPPs or received through international channels. Inspection of KTO "Operating activities" is conducted every three years and OEF process for plant's own events is part of the inspection. Inspection "Safety management" is conducted every second year and efficiency and effectiveness of OEF processes is assessed in connection of this inspection of PIP. Inspection "International Operating Experience Feedback" is conducted once a

year and focused on utilisation of OEF from foreign plants. The processes are documented in STUK's Quality Manual. The goal is to ascertain that licensees have adequate procedures and practices for investigating events and utilising operating experience.

STUK oversees the operation of NPPs and also operational events. Resident inspectors follow-up performance and operation of plants on site and inform the management and personnel of STUK about operational disturbances as well as about safety significant events or incidents immediately by phone and by e-mail during office hours and in memo-type weekly reports. Incidents and failures in equipments and systems not having nuclear safety importance, minor deficiencies in periodic tests, and near misses as well as other low level events are normally reported in weekly reports and discussed in weekly and biweekly meetings of expert groups and division heads. Selected events are presented and discussed in department meetings of director, deputy directors, assistant directors and experts of Nuclear Reactor Regulation (NRR). The meeting may decide if deeper inspections or any other actions are required before or after the routine reporting of the licensee. Reactive inspections are performed in the case of an important event or inadequate performance of the licensee. Reporting to public and into IRS system is decided also in this connection. General principle in IRS-reporting is that experience when led to corrective measures in Finland is shared with others.

STUK sends 'Early notification' on significant events via e-mail for information to the IAEA, EC, Nordic countries, Russia, Estonia, Ukraine and Germany. According to the internationally agreed principles, STUK reports INES classification of safety significant events to the IAEA as well as an event is considered to attract international public interest. Case by case decided events are reported to the IAEA/NEA IRS System.

France

The operator, considered to be the responsible for the safety of the plant has obligation to report significant events. Each event is reported in a database called SAPHIR, common to all the PWR. Among these events, those having impact on safety but not in a serious manner are called Events of Interest for Safety (EIS). For the EIS, EDF sends information to the ASN and to the Technical Safety Organisation IRSN. This information is sent by an event file extracted from the database SAPHIR. The criteria permitting to classify an event as an EIS were established by the operator in agreement with the ASN. The number of EIS declared is about 15 000 a year.

The events presenting a more significant stake for safety are the subject of a specific notification to ASN. These events are called Safety Significant Event (SSE). An event is classified as SSE if it meets one of the following criteria established by ASN:

emergency shutdown, except in the context of a deliberate scheduled action or defects affecting the turbine,

actuation of an engineered safeguard system, except in the context of a deliberate scheduled action,

non compliance with the Operating Technical Specifications (OTS) or any incident that could have led to a non compliance of the OTS, had the plant been in a different state:

- long-term unavailability or multiple inoperability,
- overshooting certain thresholds or authorized values,
- actual or potential common mode failure (fire, onsite flooding, system interaction, design or construction error liable to concern several sets of equipment or several plants units…),

- external hazard: earthquake or plane crash, for example,
- real or assumed malevolent act,
- fallback of the unit according to the OTS or accidental procedures following an unforeseen behaviour of the plant,
- event resulting or possibly resulting in multiple failures or affecting redundant trains,
- event or anomaly affecting main primary or secondary circuit,
- design manufacturing, on site assembly anomalies related to not above mentioned equipment that could lead to operation conditions not taken into account nor by design nor by operating procedures, any other event deemed sufficiently important by the operating or safety authority.

Actually about 800 SSE are reported each year for 58 units, in which the radiation protection, environment and transport events account for 212 incidents.

For a SSE, the operator has to provide to ASN and IRSN early information within 2 days (information provided by Fax) and a report, within 2 months, containing event analysis and corrective actions to be taken.

IRSN systematically analyses all the International documents in its possession as a way of exploiting international OEF. The conclusions of this survey are gathered in a document submitted to the ASN, outlining particular events that may be transposed to the EDF PWRs.

ASN completes a weekly review of events and fills its own database accessible to all ASN inspectors. French inspectors are also informed about the most interesting events (about five a week).

During quarterly meetings devoted to the operating experience, events that have been selected by IRSN and ASN are reviewed with the licensee. If it is considered that an event may be transposed directly or when the mechanism causing the event is likely to affect the French PWRs, an investigation to determine whether or not EDF should perform an in-depth analysis and possibly implement preventive measures is carried out.

IRSN also operates the relevant international systems IRS, IRSRR and FINAS.

IRSN has defined criteria for choosing events to be reported to the IRS database. The selected events are particularly those classified Level 2 on the INES scale and those seen to be precursors following the IRSN probabilistic quantification. Level 2 events normally figure in preliminary IRS reports that French IRSN coordinator endeavours to circulate in less than two months given their particular interest. The final report is issued when IRSN is able to incorporate into it the conclusions from the in-depth analysis. In addition, the following events are also declared to IRS data base:

- events that could trigger the emergency response plan,
- events already declared by other countries and which provide further information on some anomalies,
- events with no direct or potential effect on safety, but which have highlighted a new phenomenon that could be reproduced in other facilities or other systems with a greater impact on safety.

Statistically, these criteria lead to select about ten events a year on the French PWRs.

Germany

Screening of Events by the Operator

All plant malfunctions, deficiencies and abnormal occurrences or events during operation and maintenance are recorded and documented, today mainly with computer-based operating management systems. Respective plant regulations are contained in the maintenance rule (general part of the operating manual). The shift personnel performs an initial assessment of each event, takes appropriate correction measures, determines, whether it is reportable according to the reporting criteria, and initiates an immediate report to their regulator, if necessary. In daily meetings, the deficiencies and abnormal occurrences are discussed and evaluated and the required measures are specified. If an event is deemed to be a non-routine event, i.e. possibly safety significant, by the operator, further analyses following the VGB guideline for holistic event analysis will be performed. Events that are reportable due to the Reporting Ordinance (AtSMV) usually are analysed – and a preliminary INES rating is allocated –, but additional criteria are considered as well. If an analysis leads to safety significant insights, these are communicated via the VGB office to the other German utilities. Moreover, the VGB office and the operator together determine, whether an event is fed into the WANO system. Vice versa, the VGB office alerts the licensees' Nuclear Safety Officers to safety significant international events.

An additional information source is the monitoring of trends for early detection of changes in the state of important systems. The results of in-service inspections and maintenance as well as important measured values, which can indicate deviations of process parameters, are documented. This allows a life history to be created for every component. These data form the basis for a selected evaluation of individual components as well as for generic issues, for trend analyses or the determination of reliability parameter for plant-specific probabilistic safety assessments.

Significant findings are reported to the regulator: as event reports according to the Reporting Ordinance (AtSMV) or as part of regular reporting as required by the regulatory body. The Länder regulators evaluate the effectiveness of the operator's screening process during on-site inspections and by means of the reporting of their operator.

Screening of Events by Regulators

The Länder regulator and its TSO (usually the regional TÜV) perform their own screening on the safety relevance of each event reported to them and on the treatment of low-level events as well as lessons learnt. If necessary they perform inspections, review plant documentation or perform additional analyses and assessments as appropriate. The Länder regulators forward the event reports to the federal regulator, the BfS, and the GRS. The BfS conducts a comprehensive quality check for all reported events including the proper application of the reporting criteria, in order to alert the federal regulator to safety significant events. Technical in-depth screening of the events with respect to their safety significance and their significance for regulatory programmes (esp. information notices) is done by GRS on behalf of the federal regulator. The INES Officer screens all reported events with regard to the appropriate INES classification based on the preliminary classification of the operator. Moreover, GRS regularly screens international OEF (especially INES and IRS) and sends quarterly reports on international OEF to the German regulators, licensees and TSOs. Vice versa, GRS screens the German events for a possible reporting to the IRS.

Japan

JNES has the data base system and the domestic and overseas safety information including incident and

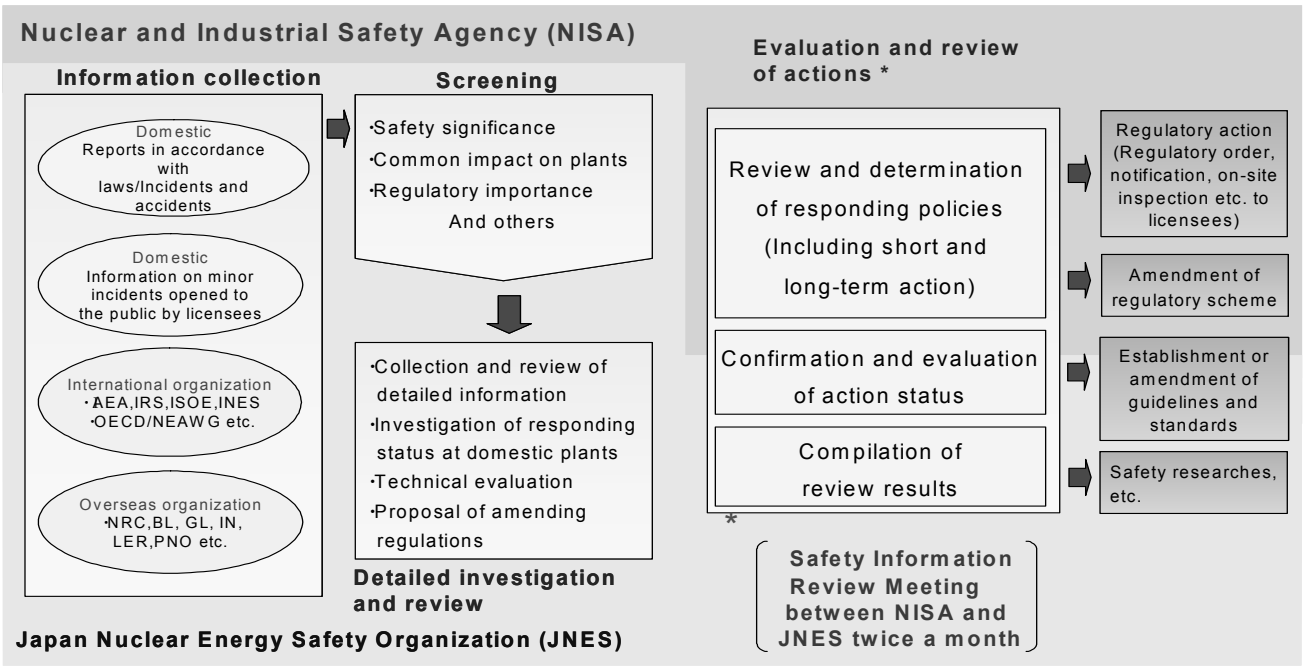


Figure-1_OEF(J)

accident data are input to it. The overseas information is from the international organization such as IAEA, OECD/NEA and from national regulatory agencies like US NRC. JNES and NISA share these collected safety information. JNES makes 1st screening of the incident and failure reports and analyze the screened issues if it should be investigated for the domestic nuclear facilities. The screened results are reported and reviewed at the Safety Information Review Meeting[2]*, held twice a month. The members are the management level of NISA and JNES. At the meeting, it is discussed if those overseas issues would affect to the domestic plants and if any regulatory actions should be taken. When it is concluded to take regulatory actions, NISA and JNES discuss the issue with the licensees. The agency sometimes requires them to investigate and to take the corrective actions if necessary. And also the laws will be amended by the agency and the codes and/or standards will be established by the industries and the societies if it is necessary. The results of the meeting of NISA and JNES are periodically reported to the Nuclear Safety Committee of Japan.

NISA reviews the utility's operational management QA systems, but do not review the specific screening process itself of the utility. NISA makes press releases of all the event occurrences reportable by the law and the utilities evaluation results with the cause analysis and the countermeasures on its English version web-site. NISA also send IRS report to IAEA according to the guideline. When any specific study

[2] * Refer to Figure-1_OEF(J)

reports are prepared, NISA also disseminate them to the overseas and the international organizations and upload on the web-site.

Mexico

Operator process

For internal operating experience, the operator uses a specific procedure for event screening. This procedure is based in a methodology that calculates the safety significance of the event. In the beginning all events are gathered through a process named *Condition Reports*; then, each one is categorized to the following subjects: Nuclear Safety, Radiological Safety, Industrial Safety, Regulation, Efficiency and Reliability, and Directives. According to the characteristics of the event, each one receives a weighting factor. For the cases that involve nuclear safety, radiological safety and regulation the factors are the biggest; therefore, the importance is higher. For those events that also are in the category of reportable events, and according to the event's characteristics it is mandatory to send to the regulatory body an Immediate Notification (less than 24 hours); and within thirty days the corresponding License Event Report (LER). Most of the plant's staff is trained to make a preliminary screening, but final determination is made by the Head of the License Department, the Head of the Radiological Department, and the Head of the Operations of each unit of LVNPS.

For external operating experience, the Department of Operational Experience of LVNPS is in charge of gathering all information from diverse sources. For a better scattering of recent external events in the nuclear industry, a selected number of them are being translated into Spanish and included in a bulletin of operational experience that is transmitted regularly and is available through the Nuclear Power Plant Division (GCN) electronic system (INTRANET) to the plant personnel. Additionally, the Just In Time (JIT) bulletins from WANO/INPO that are applicable to BWR are translated into Spanish and in accordance with the Nuclear Power Plant Division policy they are discussed in work meetings and used to continuously expand the electronic internal net (INTRANET) with documents in Spanish.

Regulatory Body process

The AOE receives all Immediate Notifications Reports and LERs from the operator. The screening process starts with a preliminary evaluation, to all events received; by two technical engineers from the AOE. Once this process finishes, a number of events, bases on safety importance are selected, and then, sent to other Areas of the Evaluation Department for a detailed evaluation by a specialist in the area of knowledge involved (for example electrical maintenance).

For external experience, the screening process is done on demand, according to the needs of the Nuclear Safety Division personnel. The screening is done using options of the IRS database, and the Web of the NRC. Specific information from the NRC web is frequently used for regulatory purposes; for example, all Generic Letters and Bulletins are screened for its application to LVNPS.

The Netherlands

The screening of events is at three levels: a. By the operator on the basis of his own requirements, the requirements of the regulator as stipulated in the VTS (see above) and the requirements of WANO; b. By the regulator on the basis of international information received (e.g. IRS, INES, IRSRR, FINAS, NucNet, LexisNexis Publisher, US NRC Information Notices); c. By domestic and foreign contractors for specific nuclear installations.

The operator makes an annual report of OEF efforts and the obtained results. This screening report is sent to the regulator for assessment and subsequent discussion.

Slovak Republic

Operators screening process of internal events is based on safety significance of the events. Screening is performed by Daily Production Meeting. The basic categories of reportable events are – Failures (P), Incidents (N) and Accidents (H).

The most important events from the safety point of view are defined in national atomic law No 541/2004 Coll. of The National Council of the Slovak Republic and on the Regulation No. 48/2006 Coll. on details of notification of operational events and events during shipment, as well as details of investigation of their reasons.

These events are reported to regulatory body and have the first priority in analysis as well as corrective action implementation.

The second group of internal events are low – level events which covers all internal reported events not reportable to regulatory body. These events usually cover secondary equipments failures, not safety important events on primary circuit, small deviations from normal procedures and human mistakes without any significant consequences.

The third group of internal events are non – consequential events and near misses. Definition of these events is the same as are in the WANO procedures.

Detail criteria for above mentioned screening process are set in plant documentation. This process is based on the WANO methodology. The NPPs use only deterministic criteria for screening of the events. Probabilistic tools are used only in analysis of the events causes.

Investigate the operator's screening process is based on requirements defined in national atomic law No 541/2004 Coll. of The National Council of the Slovak Republic:

- "§ 31 State supervision, inspection activity and nuclear safety inspectors

  - (1) The Authority shall supervise the compliance with this Act and with the other generally binding legal regulations issued based thereon, as well as adherence to the scope and conditions laid down in the decisions pursuant to Article 4, and the fulfilment of measures to eliminate deficiencies identified in protocols (hereinafter referred to as .inspection activity.). The Authority shall carry out inspection activity at authorisation holders and at persons who may be justifiably suspected to use nuclear energy for other than peaceful purposes or without authorisation or at persons who may be justifiably suspected …"

  - Investigation of the operator's screening process is performed by the Working group of OEF at the regulatory body and inspection activities are performed in case the event has potential impact on nuclear safety. Results of inspections are protocols with requirement on corrective actions and precautions with aim to reduce reoccurrence of events

Slovenia

The operator screens events based on their safety significance into level 1 to 4 events (look up level description in the next answer) in accordance with the plant procedure "Operating Experience Assessment Program".

The operator's OEF system, including screening process, is reviewed during yearly dedicated inspection. The reported events are analysed according to an internal procedure that should assure that also

insights for targeting regulatory programmes are provided. Performance indicators program is, together with inspection findings, another input for targeting regulatory programmes and indirectly includes information about low level events.

National reports are screened for international use by IRS and WGOE national coordinators.

Sweden

The operator, considered to be the responsible for the safety of the plant has obligation to report significant events. Technical specifications outline which event that are of such significance that it should be reported to the authority. The events are categorised into three different categories (See above) the number of category 1 and 2 events is about 4-500 a year. All operators have their own system for doing this, typically including meetings and the obligatory safety review which shall be performed in two stages.

All events are screened by a multidisciplinary group at the regulatory body. This group also makes recommendations on which incidents Sweden shall report to the IRS.

The inspectors have regularly meetings at each operating reactor plant where they constantly evaluating the licensee's programs for identifying, reviewing, and taking action to correct problems at the appropriate threshold. The regulator also undertakes inspections to review licensees' arrangements for screening of its own events and those from external sources in terms of applicability to their facilities. There are yearly meetings with the licensees where trends from events are discussed. The regulator also follows up the results from the audits and the audit programme at the facility.

Switzerland

The HSK has to be in the position to give its judgement on the safety-related condition and the operation of the nuclear power plants at any time, one their personnel as well as on the compliance with the legal requirements and provisions. For this task, the HSK obtains the necessary information from the inspections on the one hand, and from the notification on safety-relevant occurrences on the other hand as well as from the periodic reporting (monthly report, shut-down-report, annual report, physics report. From this information, conclusions can be drawn about the condition and the operation of the plant. If necessary, requirements und recommendations for improvements are derived from it.

Since the assessment of an occurrence is not always clear and occasionally even insignificant occurrences lead to inquiries from the public, it is necessary that the ENSI receives detailed information without delay on all safety-relevant occurrences to the ENSI.

The Inspectorate has its own process installed to assess events in nuclear installations in other countries. In the case that the Inspectorate's assessment shows potential for safety improvements at Swiss NPPs the plants are required to analyse the situation in their own installation and to take appropriate actions. For the Inspectorate the main source for information is the IRS of the IAEA/NEA. The Inspectorate is member of the system since it's foundation in 1980. The membership includes the preparation of safety instructive reports for the nuclear community and to attend and organise meetings and workshops on important safety issues.

One important process in the Swiss NPPs deals with non-conformance control and corrective actions, guided by procedures within the QM system. Any non-conformance is reported and raised as an issue in the NPP's daily morning meeting where the necessary follow up steps (e.g. work authorisations) are initiated.

United Kingdom

UK licensees are expected to have arrangements to categorise events, all the way down to near misses, according to actual or potential safety significance to determine the level of required investigation. HSE/NII undertakes inspections to review licensees' arrangements for screening of its own events and those from external sources in terms of applicability to their facilities. HSE/NII also screens event reports provided by the licensee (both reportable events and lower level events) for nuclear safety significance in accordance with criteria and guidelines set out in a documented procedure (http://www.hse.gov.uk/foi/internalops/nsd/bmm/bmmannex8.htm). This screening provides statistical information on basic causation of events which is input, together with other Operating Experience (OPEX) sources, to HSE/NII's system of regulatory reviews which operates progressively at all levels within HSE/NII and makes decisions on regulatory priorities and targeting of resources.

In addition to licensee event reports, HSE/NII screens a range of OPEX material (see Annex 1), including international events, for:

- Safety Significance
- Generic Applicability
- Trending
- Bench marking

and issues various categories of OPEX briefings to inform regulatory priorities, including:

- Information Bulletin (early information on recent major events or updates on previous OPEX Notes)
- Advice Notes (Information has provenance and pedigree)
- Action Alerts (only issued with Management Board approval)

These OPEX Notes are copied to the licensee community via the Industry OELG and may be provided directly to licensees by inspectors.

HSE/NII is responsible for operating international systems IRS, IRSRR and FINAS, and licensees screen national events for international use in accordance with the relevant system guidelines. This screening is primarily on the basis of:

- Actual or potential nuclear safety significance
- Lessons learned – from single events or common themes

The screening process also considers: generic applicability, trending, benchmarking and changes to regulatory practices. In addition, to minimise the burden on industry, HSE/NII utilises, where appropriate, for IRS, IRSRR or FINAS those events which the licensee has submitted to WANO.

United States

The NRC has a well-documented, systematic process for screening all applicable operating experience information, including events. Screening is just one of the four phases in the operating experience process, which is described in NRC Management Directive 8.7, "Reactor Operating Experience Program." The other phases include collection/storage and communication; evaluation; and application of the operating experience.

NRC's operating experience (OpE) program guidance documents direct which types of reports must be screened, and provide a consistent set of screening guidelines for the staff to use. In using these guidelines, the NRC's OpE Clearinghouse considers qualitative safety factors such as potential generic implications, adverse trends, degradation of safety equipment, complex plant transients, programmatic breakdowns in design/analysis/maintenance, and new or novel failure. In order to quantify safety significance, the OpE program also considers risk parameters such as Conditional Core Damage Probability (CCDP) and the NRC Inspection Program's Significance Determination Process related to inspection findings. When an issue is screened into NRC's OpE program, it becomes an Issue for Resolution, and is assigned to the appropriate technical staff for further evaluation. This evaluation often results in one or more recommendations for either communicating the details of the issue publicly via generic communication, or effecting change to a regulatory program via formal guidance to inspectors, temporary instruction, or permanent change to an inspection procedure.

Commercial nuclear power plant operators (licensees) are also evaluated on their ability to screen and identify operating experience issues that are applicable to their facilities. The NRC uses the Problem Identification and Resolution (PI&R) periodic inspection for this purpose. NRC resident inspectors are stationed at each operating reactor plant, and they are tasked with constantly evaluating the licensee's programs for identifying, reviewing, and taking action to correct problems at the appropriate threshold. On a biennial basis, additional inspectors will visit the plant to assist the resident inspectors in performing a formal PI&R inspection. During this inspection, the NRC assesses the licensee's Corrective Action Program in order to determine whether OpE information is being entered at the proper threshold and addressed in a timely and efficient manner. Inspectors also evaluate the licensee's programs for self-assessment and gage the extent to which the licensee garners a safety-conscious work environment in which employees feel the expectation to report safety issues.

As stated in Chapter 2 above, all domestic events rated at INES level 2 or above are communicated internationally, and reactor-related NRC Generic Communications are posted to WBIRS.

CHAPTER 4: INVESTIGATION OF EVENTS

Types of investigations are carried out by operators and by regulators and the criteria used to start an investigation

Canada

The level of analysis carried out by the licensee is determined by the safety significance of the event. Event analyses carried out by the operators are conducted according to the organization's standard and accepted methodology. At the CNSC, CNSC specialist staff periodically review licensee programs to ensure acceptability.

Criteria used to initiate an investigation vary from one licensee to another. CNSC staff initiates its own investigation of an event or a trend based primarily on safety significance but also on other factors such as media profile or the potential for identifying event causes which are generic to the industry.

Czech Republic

Operator uses WANO HPES methodology for investigations of all safety relevant events (events from Appendix 3 of above mentioned Agreement). Within the organizational structure of both NPPs, there are OEF branches responsible for events analysis. They perform event analysis including determination of causes and develop proposed corrective actions in cooperation with other plant staff. They have appropriate qualification and authority to perform these tasks. When their analysis is finished, it is used as an input for discussion of licensee's OEF board comprised of delegates from all NPPs relevant department, including plant manager. Regular meetings of this board are organized monthly, analysis of events and proposed corrective actions are confirmed and/or modified at these meetings. Corrective actions as recorded in the minutes of meeting are obligatory. If some more significant event requiring prompt identification of causes and implementation of prompt corrective actions occurs, quick analysis is performed and extraordinary meeting of OEF board is organized.

SÚJB normally does not participate in the meetings of licensee's OEF meetings, only in the case of violation of OLCs resident inspectors participate as observers. SÚJB verifies results of operator's OEF process (analysis, cause of events, adequacy of corrective actions) by regulatory inspection.

Legal requirements, information in NPPs safety analysis reports and requirements of licensee's management system documents are used as criteria of acceptability of licensee's process. For the major portion of events, engineering judgment is used for evaluation of licensee's OEF process technical adequacy.

SÚJBs' contractors perform review of safety relevant events using ASSET methodology and prepare annual reports. Content of these reports (trends, proposals for OEF system improvements, etc.) are

regularly discussed between SÚJB and licensee. Analyses prepared by contractors are also used as one of inputs for inspections for more serious events.

Finland

Look also at chapter 3.

Operational events which have, or may have, specific safety-significance and whose root causes are not obvious, shall be analysed by an appropriate root cause analysis method. Such events may include for example:

- special situations referred to in Guide YVL 1.5
- clearly identifiable deficiencies in modes of action which might lead to a safety-significant event
- common-cause failures and recurrent deviations which may have more extensive safety-significance.

Root cause analysis is performed to determine appropriate corrective actions for the removal of resolved root causes and other observed deficiencies and for the development of procedures.

Root cause analyses (RCA) methods applied at Loviisa NPP is a path method: HPES (Human Performance Enhancement System) and at Olkiluoto NPP MTO (Man-Technology-Organisation) and ASSET (Assessment of Safety Significant Event Team) methods. RCAs are made (selectively) on events requiring a Special Report; or if an event includes clear procedural deficiencies; or CCF features; or is recurring and has potential safety significance. Altogether 23 RCAs at Loviisa NPP and 22 at Olkiluoto NPP are performed.

Organisations and Operation Division of Nuclear Reactor Regulation (NRR) department of STUK performs a preliminary investigation of operational events right after incidents in order to inform the NRR department, management, and public if necessary. Specific events that may require regulatory actions are presented in the department meeting of directors and group heads of NRR.

Review of operational events by STUK is categorized by the safety significance of an event. First category is to perform a general review for operational events, transients and reactor scram reports, which are submitted for information to STUK. The second category is analysis of events which meet the set criteria for submitting a special report to STUK for approval. Analyses of the event may include more deep clarifications and discussions at the plant site. Safety significance of operational events is determined by deterministic safety analysis. Risk significance of events is determined using probabilistic analysis (PRA). Contributing or latent human and organizational factors are analysed by behavioural specialists with special techniques. The third category is to assign STUK's own independent investigation team for events due to the nature of the event or due to deficiencies in licensee's safety culture. STUK's investigation team to carry out a more detailed investigation of an event is nominated if the licensee has not investigated root causes well enough. STUK also appoints always a team to investigate the plant event, which is classified INES 2 or higher. The decision for launching STUK's investigation is done on case by case basis.

France

The access to the EIS constitutes an important contribution for the assessment of safety of nuclear installation. It makes it possible to perform trends analysis, to detect the persistence of operational

difficulties or the emergence of new issues. In addition, the databases are used to calculate reliability parameters and to feed the RECUPERARE tool developed by IRSN.

After the receipt of the SSE early notification, within a week, IRSN:

- checks the content of the fax report (is the information provided complete and correct),
- updates the IRSN database used to collect the SSE. These database is called SAPIDE
- asks more information to the operator, if needed,
- holds a first meeting to identify outstanding or precursor events. The most important of these events are the subject of a probabilistic quantification to estimate the conditional probability of core damage.

After the receipt of the SSE report, IRSN:

- carries out an analysis to examine how the event took place, which safety functions were implicated, how operators and equipment behaved, what the consequences were, together with knowledge of any similar incidents which have occurred. In addition, it is examined if, in other circumstances, the same accident would have had far more severe consequences,
- identifies the root causes of the event and examine if the same root causes applied to other equipment or systems can induce different sequences which consequences could be potentially serious,
- looks for additional information for the most significant events. Despite the quality of the event report, the information supplied usually has to be supplemented by direct contacts with the plant or the relevant EDF head office departments and, in many cases, by inspection of the building and equipment concerned,
- completes the updating of the SAPIDE database. Moreover the engineer in charge of the site safety assessment carries out the first event analysis,
- holds every week a meeting, attended by all the engineers in charge of site safety assessment, for reviewing all the SSE reports received during the preceding week. The purpose of this meeting is to:
  - inform all engineers responsible for assessing site safety of events occurring in the reactors and incite a debate on the issues raised by these events,
  - decide on the next steps in terms of in-depth analyses and IRS declarations.

A national OEF EDF team analyses the events transmitted by the NPP sites. Each week, this team has an internal meeting to screen and carry out a first event analysis. This meeting is followed by a weekly enlarged meeting (National OEF team and other EDF experts in each speciality-electricity, I&C…). During this meeting, the events screened by the OEF team are analysed. The corrective actions decided are treated like a project managed by a project leader. The information is disclosed to the sites by a weekly minute.

In addition, each site collects and analyses the events. It informs the national OEF team and, ASN and IRSN. For the safety significant events, the site sends to ASN and IRSN an in-depth analysis report. The

site organisation is similar to the national organisation that means that there is a responsible, a correspondent in each specialised branch and a committee who analyses periodically the events occurred in the site. The site team works in close cooperation with national team. The methodology applies by EDF for analysing events is described in the OEF guide.

On each EDF NPP, the analysis of events includes human factors root causes investigation. These root causes are collected and gathered in a specific data base tool. Results are examined on site and at the national level too.

In complement of the operator and regulator analyses, a quarterly systematic meeting is programmed with the operator, ASN and IRSN to look further into the analysis of outstanding events and to examine the taking into account by the operator of the international OEF.

Germany

Investigations by the Operator

If after the daily screening an event is still deemed to be non-routine a basic analysis of the event is performed as timely as possible. The basis of all analyses is the comprehensive documentation on deviations during plant operation and the results of periodic testing and in-service inspections. Basic analyses are performed with a holistic approach, i.e. considering the aspects of man, technique and organisation. If the basic analysis has not satisfactorily identified the root causes of the event, an in-depth analysis is initiated. For the latter see chapter 5.

Investigations on behalf of the Regulator

The Länder regulator receives (preliminary or final) reports on reportable events according to the Reporting Ordinance (AtSMV) by the licensee. In a first assessment the regulator then decides if there is any need for immediate or short time regulatory action (e.g. shutdown). For reportable events, the regulator usually commissions its TSO (mainly regional TÜV) to give an expert opinion on the completeness of the licensee's findings, the safety significance of the event, and the appropriateness of the corrective actions. Therewith, the regulator arrives at its final assessment or may require the licensee to perform further analyses, may perform on-site inspections to verify the implementation of corrective actions, and will assess the relevance of the event for other plants under its supervision.

On behalf of the federal regulator, GRS routinely performs investigations into reportable events in expert level discussions. If the event is found to be safety significant and relevant to other German plants, an information notice is prepared by GRS and issued by the federal regulator to the Länder regulators, the German TSOs, and to the licensees. The follow-up reports on information notices by the licensees and the Länder regulators are then evaluated by GRS. Additionally, the federal regulator assisted by GRS decides on notable German events to be reported internationally, e.g. through IRS. During the preparation of IRS reports GRS experts may conduct further investigations. Vice versa, on behalf of the federal regulator GRS performs investigations into international events, which may result in information notices or other federal regulatory actions. Finally, GRS conducts a screening for precursors for all German reportable events and performs precursor analyses for selected, possibly relevant cases. The results of these analyses are communicated to the German licensees, regulators and TSOs.

As the responsibility for the supervision of nuclear power plants by law lies with the Länder regulators, the federal regulator does not survey the supervision process for all events. However, for significant events (e.g. events of increased safety significance) the federal regulator, assisted by BfS and expertise from GRS, reviews the regional regulatory process.

Japan

When the reportable event occurs at NPP, the utility first report it to the agency. Then they investigate its causes and effects, make the root cause analysis, and establish the countermeasures including the modifications of systems and/or equipment to prevent the recurrence.

When NISA receives the utility's event report, NISA and JNES review the incident data base and check if any similar events have happened in the past. NISA reviews the utility's event report with the cause analysis and the countermeasures. NISA and JNES evaluate if further investigation and/or feedback is necessary to other plants.

Mexico

Operator process

LVNPS has developed a specific program to review Internal Operational Experience at both units in order to ensure that such experiences are incorporated as corrective actions to avoid recurrence as well as to improve the safety and reliability of LVNPS units.

This program includes all abnormal events evaluated and reported by any organization of the General Manager, mainly by those related to its operation. Under this context, the scope of the program covers the event's investigation, its analysis to determine the root cause, determination of corrective actions.

In addition to the events that due to their nature generate a LER, LVNPS has decided to analyze other events which, although they do not reach the category for being notified to the Regulatory Body, are of importance because of their consequences on the reliability of LVNPS-1 & 2. These analyses are denominated *Condition Reports*, among these, the following can be mentioned:

- Unplanned decreases in power >10%
- Unplanned ½ SCRAM (during operation or start-up)
- Unplanned ½ isolation (during operation or start-up)
- System or component inoperabilities, which oblige to request an Exception to Techs Spec's to avoid unit shutdown.
- Any other having important consequences for reliability such as, damage to equipment having impact on plant reliability factors or sensible systems; unplanned radioactive releases on or off-site; release of explosive gases at the plant; mistakes (non-assigned tasks, outages, jumpers or badly installed/removed disconnection's, applying procedures, etc.)

Regulatory Body process

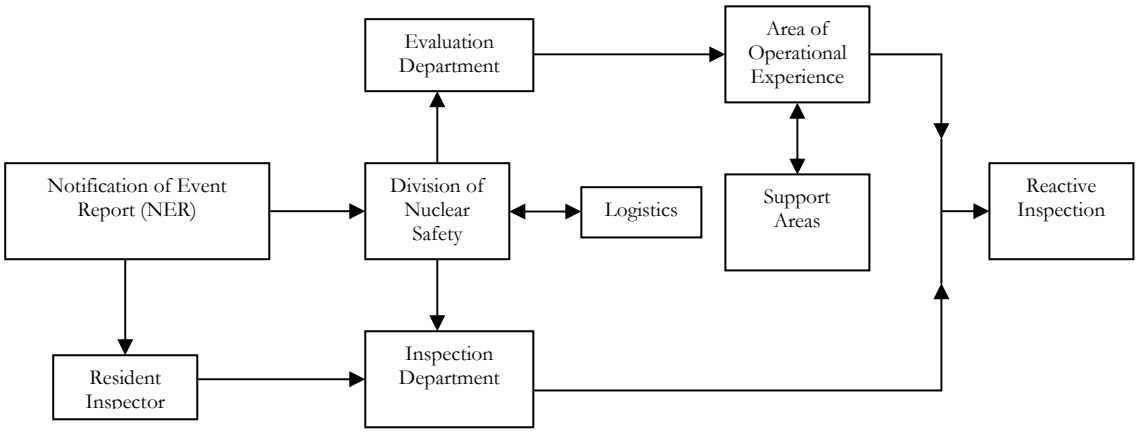
Upon receiving the Immediate Notification Reports, in order to make the decision for sending a Reactive Inspection, the upper management considers the following:

- The resident inspector assessment of the event. A Special Investigation Team can be organized upon the request of the Resident Inspector to the Inspections Department

- The INES preliminary rating of the event. Usually events rated Level 2 and higher in the INES scale are considered for a Reactive Inspection.

- Reactor operator and operating organization performance during the event. If their performance did not respond adequately, taking into account safety culture and conservative adherence to procedures.

The flowchart below shows the process schematically.



Those events that are not considered for an Augmented Inspection follow the process of evaluation and documentation to determine trends and verification of the corrective actions during the process of routine inspections.

The Netherlands

Types of investigations carried out: a. Routine inspections of a specific component, system or administrative process; b. Group inspections by two or more inspectors in case of a specific problem requiring a multidisciplinary approach; c. Audits of (certain aspects of) the quality assurance system of the operator; d. Group audits of complex systems or administrative processes (like safety culture or safety management); e. Inspections by missions of multinational or international organizations (e.g. OSART, INSARR, IPPAS, IRRS, WANO missions) of the organization of the operator.

Slovak Republic

All internal events are analyzed to identify causes of the events. All events reported to the regulatory body are analyzed for root causes. The NPPs use HPES methodology as a systematic tool for identifying root causes of the events. If the event is simple or the cause is obvious, the full scope of HPES is not used. In this case, only one of HPES techniques (Task analysis, Change analysis, Barrier analysis) can be used. This year, the NPPs OEF members passed special training from Tap Root methodology for event analysis. The NPPs have program to introduce this methodology in real practice.

Events are analysed by the Working group of OEF at the regulatory body and inspection activities are performed in case the event has potential impact on nuclear safety. Results of

Slovenia

The operator performs the investigation according to the significance of the events in accordance with the relevant plant procedure:

- level 1 are more significant events that affects safety of the plant as for instance severe or unusual plant transients (trip, major safety equipment damage, unusual external conditions,…), redundant safety system malfunctions or improper operations (equipment or actuation failures, improper operation of plant personnel, …), events involving nuclear safety (two or more concurrent failures of redundant components, technical specification violations,…), fuel handling or storage events, excessive radiation exposures or severe personnel injuries, excessive discharge of radioactivity, and events for which management considers complex enough that full Root Cause Investigation is necessary. On-site event report shall be performed within 15 days.

- Level 2 are less significant SSC or human deficiencies which effect plant safety or reliability. On-site event report shall be performed within 30 days.

- Level 3 are minor conditions which effect quality of process but there is a low potential to effect plant safety. Apparent cause investigation shall be within 90 days.

- Level 4 are minor conditions which do not affect the quality of process and there is no consequence to the plant. Event investigation is not required while the failures and near-miss issues are used for trending purposes.

Regulator performs review of every event report and compares the results with the operator's results i.e. corrective activities. For events that:

- are repeated,

- exceed core damage frequency for more than 1%,

- are rated at least as INES level1 events,

- or where the radiation contamination or exposure of personnel/population is above limit,

regulator performs detailed root cause investigation independent of the operator's activities and performs also PSA event analysis if such an analysis is possible due to PSA model limitations.

Sweden

According to SKIFS 2004:1 chapter 5 4 § "Investigation of events and conditions" described above the licensees shall investigate their events and conditions. The level of analysis carried out by the licensee is determined by the safety significance of the event. All safety relevant events are analysed and the LERs have fields for describing the main findings from root cause analysis and which corrective actions they have taken immediately and will undertake to avoid recurrences. Internal procedures include technique and methodologies for carrying out an in depth analysis. Plant staff is trained in basic root cause methodologies.

At the regulatory body the screening group makes recommendations and proposals to the management regarding safety significance, misgivings or repeated events.

For events of special interest the regulatory body sends out an inspection team for an investigation on site

Switzerland

The safety impact of non-conformances is evaluated with an internal process. In the case of events that reach the level of notification, the non-conformance is reported to the Inspectorate. A plant internal investigation team starts a thorough analysis of the event. In the case of more complicated contributing factors, e.g. human and organizational factors, the operator uses dedicated root cause analysis methods. All processes are inspected by the ENSI.

United Kingdom

Licensees' processes for investigation of events are defined under their arrangements for compliance with Nuclear Site Licence Condition 7. The level of investigation is dependent on the potential severity of an event and can vary from a facility-specific investigation through to a Board of Inquiry involving senior licensee staff and detailed root cause analysis. These investigations identify corrective actions and timescales for implementation.

HSE/NII checks the adequacy of licensees' processes and follows up the licensee's response where an event poses safety concerns. HSE/NII has a documented procedure (http://www.hse.gov.uk/foi/internalops/og/ogprocedures/investigation/index.htm) which sets out criteria for deciding which events to investigate and defines the investigation process. In summary, all nuclear events reported as INES 1 and above, and those meeting Ministerial reporting criteria (see Chapter 2) are subject to preliminary investigation by a nuclear inspector. In addition, all incidents (INES or otherwise) are formally investigated where it is immediately evident, or where initial enquiries, or a preliminary investigation of the incident reveals that:

- there appears to have been a significant challenge, or potential significant challenge, to nuclear safety
- it appears there was, or could have been, a significant breach of nuclear site licence conditions or other relevant statutory provisions
- there has been, or there was potential for, a release of radioactivity that was above or approaching the statutory reporting limits, or a dose to an individual above the dose limit
- the licensee has acted knowingly in not taking conservative action
- there have been a number of incidents that have the same apparent cause.

United States

Nuclear power plant licensees perform event follow-up activities when the cause of the event is not clear or presents a safety concern. Equipment failures are evaluated for common cause characteristics to ensure a defect does not exist that can affect other similar components. A licensee's root cause investigation often provides key details of why a failure took place, and whether there were symptoms that their operating experience program should have discovered prior to the failure.

All events receive a follow-up investigation by the NRC resident inspector. When an event meets certain deterministic safety-related criteria, the NRC will perform additional analysis to quantify its risk-significance. Once certain risk parameters are met, the NRC will follow-up with a more detailed reactive

inspection. Reactive inspections occur at three distinct levels of severity. The severity can be determined either by assessing which deterministic criterion was met, or by calculating the risk numbers for the event. As with other regular inspections, reactive inspections can also result in varying levels of findings against the licensee. The three levels of NRC reactive inspection, from least to most severe, are 1) Special Inspection, 2) Augmented Inspection Team, and 3) Incident Investigation Team. NRC Manual Chapter 0309, "Reactive Inspection Decision Basis for Reactors," defines the process for determining which level of reactive inspection is appropriate for a given event. It is available at http://adamswebsearch2.nrc.gov/idmws/doccontent.dll?library=PU_ADAMS^PBNTAD01&ID=080140658.

CHAPTER 5: IN-DEPTH ANALYSIS

Information on how what types of in-depth analysis are carried out by the operators and by your organisation and the criteria used in the analysis

Canada

In-depth analyses carried out by the operators and the criteria used for these analyses are based on the individual operator standards and methodology. The operator procedures for conducting Root Cause Analyses are generally based on well-known methodologies such as HPES, TapRooT, or MORT.

CNSC staff conducts reviews of the operator reports to confirm the operator methodology was applied correctly and to confirm the adequacy of any corrective action identified. CNSC staff may also conduct its own analyses using industry accepted methodologies such as HPES, TapRooT, or MORT.

Czech Republic

All safety relevant events are analysed – HPES methodology is used by NPPs. Review of fulfilment of legal requirements is performed by SÚJB staff, ASSET methodology is used by SÚJB contractors. Risk precursor analysis is performed for relevant events. Internal SÚJB discussion was initiated recently on the use of MORT methodology; however no decision on the use of this methodology was done yet. Criteria used in the analysis are those defined in listed methodologies.

If event is of higher safety significance or is more complicated, sufficiently more detailed analysis is performed at both operator and regulator side, i.e. graduated approach is used.

Finland

See Chapter 4.

France

Within the framework of its mission of evaluation of safety, IRSN addresses each quarter to the ASN an analysis announcing the events of the past period which deserve according to him a detailed attention and a treatment by EDF. This opinion also relates to the treatments implemented by EDF within the framework of the safety analyzes. A quarterly technical meeting between ASN, IRSN and EDF allow exchanges on this subject

Continuously, the IRSN carries out a thorough analysis of the significant events which occurred on the nuclear installations. The objectives of the event analyses are:

- the detection of precursor events,

- the identification of design and operating weakest points of NPPs,
- to examine if the corrective actions implemented by the operator are sufficient.

Moreover, OEF is examined in the framework of the:

- definitive start up authorisation,
- ten yearly periodic safety reviews. The decennial appointment of the periodic safety reviews and the revaluations of safety is an occasion, for again, to adopt an interrogative attitude with respect to the OEF.
- the periodic examination of OEF by the Advisory Committee for Reactor Safety (GPR). Every 3 years a meeting of GPR experts is organised in order to examine the significant incidents of this period. The objectives of this meeting are to put forward operating measures or modifications of materials which result from complex studies resulting from in depth analysis of incidents (safety studies…). The choice of the topics handled at this meeting is fixed by the ASN after consultation of IRSN. The preparation of this meeting requires a technical instruction of the topics between EDF and the IRSN. At the end of this instruction, IRSN issues a report that is used to support the GPR meeting. This report carries out an in-depth analysis of significant events. It analyzes the files transmitted by the licensee and evaluates acceptability, with respect to safety, of the position of the owner and the possible provisions which it proposes. At the exit of the GPR meeting, the GPR members give an opinion on the safety of the operation of the NPPs and, if necessary, make recommendations. On the basis of opinions and recommendations of the GPR, as well as positions taken by the licensee, ASN prepares its decision and send demands to the operator.

In additions, IRSN carried out:

- trend analyses that are facilitated by the similarity of the French NPPs,
- probabilistic quantification of precursors.

In complement of this analysis, a quarterly systematic meeting is programmed with the operator to look further into the analysis of outstanding events and to examine the taking into account by the operator of the international experience feedback.

Germany

In-depth Analysis by the Operator

The German operators use the VGB guideline on holistic event analysis for in-depth analysis. According to this, the SOL (Safety through Organisational Learning) methodology developed by VGB is applied. A structured model of the event progression is constructed (functional chain) including technical failures and human action. Then, for each sub-event the contributing factors are analysed, corrective actions derived and lessons learnt or good practices documented. To this end, the operators can use a computer tool that has been developed to assist in analyses with the SOL methodology. In addition, the licensee may use external expertise, e.g. from HF specialists or vendors. This approach is compatible with the recent guideline on holistic event analysis issued by the Reactor Safety Commission.

In-depth Analysis by the Regulator

The Länder regulators assess the quality and appropriateness of the licensee's analyses with the help of their TSO. If necessary, the licensee is required to refine or expand its analysis. However, if there are doubts on the licensee's findings on an event or the safety significance of an event warrants such action, the Länder regulators may commission their TSOs to conduct their own in-depth analyses. On behalf of the federal regulator GRS performs in-depth analyses on generic safety issues. The results and conclusion for these issues are disseminated to the Länder regulators, German TSOs, and the licensees. Finally, GRS performs precursor analyses for significant German events.

Japan

The utilities usually do analysis to cope with the safety related event and report to NISA with the cause analysis and the countermeasures, and NISA review if it could be accepted.

The regulatory agency first review the data base and check if any similar events have happened in the past. Then with the existing knowledge and referring the past event report, the agency review the utilities report.

If the event is a new safety significant issue and require in-depth analysis including laboratory experiments, the agency make independent event investigations with regulatory side or neutral organizations. Detailed event analysis is done by NISA, JNES and/or JAEA, the detailed root cause analysis by JNES and sometimes experimental works by JAEA and/or other neutral organizations. NISA also organize ad-hoc investigation committee with the experts from outside the agency such as academies and the research institutes.

Examples of the in-depth analysis are for "Hydrogen explosion of RHR steam pipeline at Hamaoka Unit No. 1", "Feedwater pipe break at Mihama Unit No.3" and "Incidents at Kashiwazaki-Kariwa NPS by Chuetsu-oki earthquake". In case of Mihama Unit No.3, JNES did structural analysis of the FW pipe ruptures and JAEA did metallurgical investigation of the ruptured pipe.

Mexico

Operator process

In depth analysis is carried out for most of the reportable events; this is required by the regulatory process. All LERs have a root cause analysis and corrective actions sections, where the main findings are described and the suitable actions proposed with deadlines for avoiding recurrences. Internal procedures include technique and methodologies for carrying out an in depth analysis. These techniques and methodologies are derived from international practices such as WANO's. Plant staff is trained in basic root cause methodologies that include Human Performance Evaluation System (HPES) and other commercial methodologies. For more complex investigations, the operator hires other supporting organizations, the National Nuclear Research Institute.

Regulatory body process

In depth analysis is made in most of the Reactive Inspections for events that are complex and have importance from the safety perspective.

The techniques and methodologies used by the operator and by the regulatory body can include the following:

- Data collection: This is an important phase which will assume the veracity and exactitude of the information. The data to be collected has to be from conditions of the plant, before, during, and after the event; the people implicated (including actions taken); environmental factors and other information which could be of importance for the condition or problem. The physical evidence must be kept, such as failed components, joints broken, burnt cables, damaged fused, spilled fluids, task orders partially or not executed, erroneous procedures, etc. From experience, the Augmented Inspection Team usually verifies that this data collection activity has been done by the root cause analysis group of the utility, jointly with the event's involved areas such as the mechanical or electrical maintenance groups.

- Interviews and reviewing documentation: This activity has to be carefully planned in order to obtain the information as reliable and complete as possible. It has to be done in a personal manner. From experience the AIT first interview to the personnel in charge of carrying out the investigation of the event and then verifies this information with the people directly involved in the event. Any disagreement among them is a lead to be followed in the investigation. Along with this activity it is the reviewing of the documentation of activities related to the event, such as maintenance orders, surveillance requirements tests, operating logs, vendor manuals, drawings and specifications, designs basis information, external and internal experience reports.

The purpose of event analysis is the reconstruction of the event, where the investigator will make a chronological sequence of events and activities. In order to identify the root causes, the following methods are the most used:

- Events and Causal Factors Charting (ECFC): This is the first method to be used. Diagrams help to show graphically what is known and what has to be inquired upon. It has the advantage of organizing the available data, serves as a guide to find the direction that the investigation has to go, it helps to summarize facts and activities related to the top event, and it is a good start for writing the report.

- Barrier Analysis: This is a systematic process that can be use along with the ECFC method, it helps to identify physical, administrative, procedural or other barriers or controls that were bypassed and did not prevented the occurrence of an event.

- Change Analysis: This method is a simple process, generally used to analyze an individual event, and focuses into the elements of a system or process that has changed. It compares the real conditions with the ideal conditions; the differences are then evaluated to find the contributing factors for the event's occurrence.

- Fault Tree Analysis: This method could be used to analyze failures of systems, equipments and components that require technical experience, one advantage is that a set of question can be prepared well before the investigation starts, it relies very much in studies from operational experience.

- Management Oversight Risk Tree (MORT) : This is a fault tree type method which covers most of the above methodologies in a complete method, where a set of questions guides the investigation, together with the use of a big chart which gives a better scope of the causes of the event at different levels, such as the interfaces between people, procedures and equipment. This method is lengthy, therefore costly and its use is for those most relevant events.

The root cause determination has to be tested with the following criteria:

1. The problem would not have occurred had the causes not been present?
2. The problem will not recur due to the same causal factor if the causes are corrected or eliminated?
3. Correction or elimination of the cause will prevent recurrence of similar condition?

The process mentioned above has to be completed by corrective actions that assure the following:

1. Will these corrective actions prevent the recurrence or conditions?
2. Is the corrective action within the capability of the utility to be implemented?
3. Does the corrective action allow the utility to meet its primary objective – the safe and reliable production of power?

The Netherlands

Both operators and the regulator carry out various types of in-depth analyses. They include: a. Root cause analysis of a single event; b. Analysis of the consequences of an event similar to a foreign event of major safety significance in their own domestic situation; c. System response analysis in case of a major plant change.

Slovak Republic

See Chapter 3 and 4.

Slovenia

In-depth analysis techniques, performed by the operator are:

- event and causal factor charting,
- change analysis,
- barrier analysis,
- task analysis
- management oversight and risk tree (MORT) is also available.

The regulator uses event and causal factor charting and PSA event analysis for in-depth analysis while the tools for management oversight and risk tree (MORT) are also available.

Sweden

In-depth analyses carried out by licensees are expected to be appropriate to the safety significance of the event and the criteria used. The licensees have different criteria for starting an in depth investigation and they have different levels of their investigations. The Swedish nuclear industry has been using the same method since the 90-ties, the MTO (Man Technology Organisation) method. The basis for the method is that human, organisational, and technical factors should be focused equally in an accident investigation. The method is based on HPES (Human Performance Enhancement System).

Switzerland

After each event in a Swiss NPP in which human factors have played a role, the involved human performance and organisational aspects are investigated. All NPPs decided to use systematic methods for in-depth event analysis. The co-ordinators for event analysis are trained in the application of this tool and acquired additional Human Factors expertise in specialised institutions.

The operator has to report a summary of the results of the In-depth analyses to the regulator, as basis for an inspection of these analyses carried out at the facility. Due to possible personal data within the in-depth analysis the licensee don't have to deliver a detailed report of this kind of analysis. Here the inspection focus is more on the process than on the findings below the notification level.

The Swiss Nuclear Energy Ordinance requires that NPPs establish a group that analyses human factor contributions to a safety significant event. All NPPs are about to install such groups and to provide them with adequate education and training. The University of Applied Sciences of Northwestern Switzerland is about to initiate a post graduate course in safety psychology. In this context the University created a special Forum which meets several times a year for discussions of human and organisational issues. Swiss NPPs, HSK, the aviation industry, public transportation companies and chemical industries are represented in this forum for exchange of experience.

Any weaknesses in these areas discovered by such investigations lead to assessments of similar situations in all other Swiss NPPs.

United Kingdom

Under nuclear site licence condition 7 and MHSWR Regulation 5, it is expected that licensees will carry out event analysis appropriate to the safety significance of the event. This should include root cause analysis for the more safety significant events (covering technical and management of safety issues), identification of corrective actions, commensurate timescales for their implementation and systems in place for tracking progress. Operating experience is shared between licensees via the Industry OELG.

- HSE/NII carries out investigations to:
- gather and establish the facts
- identify immediate and underlying causes and the lessons to be learned
- prevent recurrence
- detect breaches of legislation for which HSE is the enforcing authority
- take appropriate action, including formal enforcement.

HSE/NII may, where appropriate, place corrective actions on licensees as a result of its investigation findings and take enforcement action depending on the severity of weaknesses in licensees' arrangements. Wherever possible, persuasion is used to influence the licensee to make improvements. HSE/NII also has legal enforcement powers, including:

- 'approval' of licensees' arrangements (the ability to freeze the arrangements so that they cannot legally be changed except with the permission of HSE/NII)
- specification of changes to licensees' arrangements
- regulatory enforcement notices
- prosecution.

In addition, HSE/NII's investigation may identify opportunities to improve HSE/NII's regulatory effectiveness.

As noted above, HSE/NII reviews operating experience from a variety of sources, to determine relevance to regulatory intervention strategies. If so, appropriate OPEX briefings are issued within the regulatory body and progressed with licensees through inspectors and also via the Industry OELG.

United States

Licensees have Corrective Action Programs for identifying and tracking which issues require additional follow-up and analysis. As stated in Chapter 4 above, licensees will normally perform a root cause analysis for any significant event to determine its safety significance, and the potential extent of condition effects on other similar systems and components. All licensees are members of the Institute of Nuclear Power Operations (INPO) and have access to INPO's internal network for rapidly communicating operating experience (OpE) information.

The NRC's regional offices and headquarters program offices correspond on a regular basis to share information related to the in-depth analysis of OpE. As discussed above, any event that the OpE Clearinghouse screens in to the OpE program becomes an Issue for Resolution and receives an in-depth evaluation and analysis by the NRC technical staff. Issues for Resolution often lead to further analysis and agency action in the form of a Generic Communication, changes to an inspection procedure, or other agency activity. In addition, the regions can request technical assistance in evaluating an issue via the formal Task Interface Agreement process, through which they would ask the headquarters technical program office to perform a more detailed analysis of the issue.

The NRC Generic Issues Program (GIP) provides a standard, repeatable screening process for issues with potential risk significance to be addressed and resolved by the agency or industry. Potential issues are presented by the NRC staff to the Office of Research, and undergo a risk assessment to ensure they are safety significant. Other criteria that can result in an issue being screened into the GIP include:

- Affects public health and safety
- Issue is well-defined, discrete, and technical
- Issue is not readily addressed by existing regulatory or industry programs
- A new or revised regulatory policy can solve the issue, along with action by licensees

Once a generic issue is screened into the GIP, it is assigned to the appropriate technical office for resolution. A task manager is assigned to set and track milestones for the various agency and industry actions that are proposed to resolve the issue. Some of the regulatory vehicles used to close generic issues include: Regulatory Guide, Rulemaking, Generic Letter, NUREG, and changes to the Standard Review Plan. Periodic updates on open generic issues are provided on the NRC public web page at: http://www.nrc.gov/about-nrc/regulatory/gen-issues.html.

CHAPTER 6: CORRECTIVE ACTIONS

Actions taken by regulator to ensure corrective actions are performed

Canada

CNSC staff reviews the licensee reports to determine the acceptability of the corrective actions undertaken by an operator in response to an event. CNSC staff may also make recommendations or impose additional corrective actions on the operator. The actions identified by the operator are recorded in the CNSC Central Events Reporting and Tracking System (CERTS). The event record in CERTS is closed by CNSC staff when all issues related to the event have been satisfactorily addressed. The actions imposed by CNSC staff are recorded and tracked by Regulatory Program Division staff which oversees compliance for the operator facility. These actions are also closed by Regulatory Program Division staff when they have been satisfactorily addressed by the operator.

Czech Republic

SÚJB verifies completeness and status of implementation of corrective actions related to safety relevant events during periodical regulatory inspections.

As the first step, it is always assessed whether for each root and direct cause of particular event appropriate corrective actions are required. Corrective actions should be aimed to prevention of the event repetition. This 1st step of assessment is usually finished when SÚJB performs review of recent events in the course of periodic regulatory inspection.

As the second step, which usually lasts for some time period, status of implementation of all corrective actions is periodically evaluated until their completion. If corrective action is not implemented within time frame appropriate from the safety standpoint, SÚJB has the force to require its implementation. Such requirements are recorded in inspection reports and they are obligatory.

Finland

Licensees must have their instructions and procedures to identify necessary corrective actions to implement them. The progress of decided corrective actions shall also be followed.

STUK follows and verifies the implementation of corrective actions as part of its regulatory oversight processes of nuclear safety and as part of its periodic inspection program for operating NPP's. Licensees' reports on the utilisation of operational experience are submitted to STUK for information once per year. Reports contain a description of operational experience feedback activities and also a list of events for which corrective measures have been implemented or are under implementation by the utilities. The report is reviewed by technical specific divisions of NRR to assess the stage of implementation and the adequacy of corrective measures to avoid recurrence of such events. The reports are inspected to assure that

operational experience feedback activities are carried out as described in YVL guides and in quality assurance manuals of the utility.

France

ASN inspectors are in charge of monitoring the implementation of the corrective actions. So the inspectors are informed of most important events (notably recurrent events) occurred and the correctives actions decided. When for an inspection topic, an event has a link with this topic the inspector has to check that the corrective actions are effective and, if necessary, define the continuations to be given (complementary requests, adjustment of corrective actions, inspections).

Every three years, a GPR is devoted to the OEF (see Chapter 5). The safety assessment has notably an objective to see if the design and/or operating modifications carried out further to OEF are efficient. In addition, during Periodic Safety Review the most important modifications are the subject of IRSN analysis.

Germany

As described in the previous chapters, for each event the operating manual requires the shift personnel to take all necessary actions to guarantee the continued safe operation of the plant according to their first assessment of the event. One aim of the licensee's event analysis is the deduction of appropriate corrective actions. For reportable events, these corrective actions have to be described in the formal report to the regulator. The Länder (or regional) regulator in turn usually commissions his TSO to evaluate the appropriateness and completeness of the corrective actions. Periodic evaluations are carried out not only to monitor the progress of certain recommended actions but also to review constantly the need for items in the outstanding corrective actions list.

The regulator verifies that licensees and industry take appropriate actions to assess the operating experience and take adequate actions to maintain and improve the safety of all plants. This refers not only to immediate actions but also to follow-up actions after detailed investigations to verify or restore confidence that the plant is in the license status. It also refers to investigations regarding lessons that can be learnt to improve safety in general beyond the current licensing base. The authorities and their support organisations further monitor the adequate implementation of corrective actions and derived measures and evaluate the applicability of an event to other plants in their area of supervision. The federal regulator evaluates the appropriateness and completeness of the corrective actions as necessary.

Japan

To ensure the corrective actions, NISA submit regulatory letters to recommend or enforce the utilities to take actions and request to report when completed. Their status is followed by the check list. Further they are checked during the periodic safety review (PSR) of each plant.

Mexico

Routinely, the regulatory body performs inspections to the Corrective Action Program of the operator in order to ensure these are carried out in a properly manner.

The Netherlands

Corrective actions by the regulator include: a. Inspection reports with specific action points; b. Letters with a requirement with a deadline; c. Letters with a warning; d. Letters with a potential administrative fine should a certain circumstance or event be repeated within a defined time frame; e. Administrative prosecution; f. Criminal Act prosecution.

Slovak Republic

All corrective actions resulting from the event analysis are regularly tracked and checked by the plant event committee (the Committee of operational events and selected precursors), which take place every month. The Committee of operational events and selected precursors is multi-profession group. Average time fulfilment of CAs implementation is 90%. The NPPs have a special event database, which contains also the dates about corrective actions.

Slovenia

Supervision of performed corrective actions is in the domain of inspection. The supervision is performed during the regular site inspections. The inspection also deals with any observed deviations from corrective actions.

Sweden

In the LERs corrective actions are described. The Corrective Action Program are followed up on routine regulatory inspections.

Switzerland

To ensure the corrective actions, ENSI submit regulatory letters to recommends or enforce the utilities to take actions and request them to report when completed. Their status is followed by the check list. Further they are checked during the periodic safety review of each plant. The regulator implemented the process "Enforcement" to supervise the measures of the operator. After the decision on adequate remedies the implementation is assigned to a division of the operator. The finalisation has to be reported to the regulator.

United Kingdom

HSE/NII inspectors review licensees' processes to ensure that adequate systems are in place for tracking progress and implementing corrective actions raised by the licensee itself and by the regulator. Inspectors also verify on a sample basis that licensees implement safety significant corrective actions in a timely manner. This may be done in a number of ways, including: inspection on the site, requesting licensees to provide regular progress reports, periodic (normally annual) reviews of safety between the licensee and the regulator or enforcement action

United States

The NRC inspection program provides a repeatable, consistent process for inspectors to verify the licensees' thoroughness in performing corrective actions. In performing Problem Identification and Resolution (PI&R) inspections, NRC inspectors review every entry in the licensee's corrective action program, and select the best samples for follow-up. The goals of this inspection include:

- Verify that equipment, human performance, and program issues are being identified by the licensee at the appropriate threshold and being entered into the corrective actions program
- Verify that corrective actions commensurate with the significance of the issue have been identified and implemented by the licensee
- Ensure the licensee is evaluating a broad range of source documents when reviewing industry data for items to screen into their corrective actions program

Under the Generic Communications program, the NRC can request information or actions by licensees to address various safety issues. When issuing a Generic Letter or Bulletin, the NRC will normally request that addressees provide information within a certain time period. The information provided allows the NRC to further gage the extent of the issue.

When it becomes necessary for the NRC to direct that certain actions be performed by one or more licensees to address a safety issue, a Confirmatory Action Letter (CAL) or an Order is issued. CALs and Orders direct licensees to perform certain actions that the NRC has determined are necessary for public health and safety.

CHAPTER 7: TRENDING

Operator or regulator trending of events, including methodologies used, and use of trending to identify good practices

Canada

Canadian Standards Association Standard CAN/CSA-N286.5-95 Operations Quality Assurance for Nuclear Power Plants section 5.11 sets out the requirement for Operating Nuclear Power Plants (NPPs) to perform trend analyses "to identify repetitive problems or repetitive causes." CNSC staff from specialist divisions such as Human Factors and Quality Assurance also categorize and trend events using differing methodologies. Methodologies used vary across licensees. Good practices are not required to be trended or reported to the CNSC. HOPD uses XMR Control Charts and frequency counts to generate non-compliance indices that are used for trending. Events are categorized by Human Factors Review Area, HPES category, and Organization and Management Behaviour.

Czech Republic

Yes, trending of various types of information is performed by both operator and regulator.

SÚJB is trending the following performance indicators:

- Number of events
- Number of safety relevant events
- Number of events classified as INES < 0
- Number of events classified as INES 0 or higher
- Number of events where human factor was a cause
- Number of OLCs violations
- Number of OLCs forced actions
- Number of OLCs entries
- Summary of time when OLC were entered
- Number of temporary changes to OLCs

- Number of forced power reductions and outages
- Unplanned capability loss factor
- Unplanned automatic scram
- No. of demands on RPS/ECCS/RHR/Electric Power Systems
- No. of hours a safety system is unavailable and various detailed system specific indicators
- No. of times a safety system is unavailable and various detailed system specific indicators
- Collective radiation exposure
- No of failures of selected safety systems on demand
- No. of failures of selected safety systems during tests
- Fuel status – FRI factor
- Number of leaking fuel rods
- Containment leakage

We cannot conclude based on this trending that there are any evident good practices related to the OEF at our NPPs.

Finland

Apart from the significance of a single event, licensees' attention is also paid to the event's rate and likeliness of recurrence. This analysis is supported by a failure and event register drawn up on the basis of previous events.

STUK's event database (TAPREK) also enables to perform queries based on the causes of event, related factors and contributing organisational units.

Number of event reports in different categories: special reports, disturbance reports, and incident reports are followed by licensees and by STUK. In addition, different causes (technical, human) of events are followed by STUK's plant performance indicator system. Risk significance of operational events is followed by PSA based indicators as well.

Safety performance indicators of STUK have been maintained since the mid of 90's and thus the common touch concerning the average level of events in different categories or their causes are normalised. Variations from these average values are followed and assessed. Positive trending can also be identified using these indicators.

Definitions and results of STUK's safety performance indicators are available in appendix 1 of annual report on "Regulatory control of nuclear safety in Finland" http://www.stuk.fi/julkaisut/stuk-b/stuk-b92app1.pdf.

France

IRSN has developed various methods for analysing operating experience feedback. The indicators are an addition to all the other tools available to assess the safety of the EDF facilities (58 units).

The indicators should give as faithfully as possible an image of the overall safety level of the French nuclear plants and should ultimately be used to assess performance degradations (or improvements) in terms of safety (for instance performance of safety functions, equipments, organisation, etc.), in order to point out their potential effects within the shortest time.

These indicators relate directly to safety, radiological protection and releases. They should highlight any trend that combine with other information and analysis sources to provide us with lessons on safety issues.

To summarise, the indicators are intended to:

- Perform a permanent watch on the overall safety level of the facilities,
- Identify trends in significant safety aspects and, if appropriate, detect degradations sufficiently early to inform the French utility and the French Safety Authority,
- Assess plant homogeneity and highlight any disparities and specific features between plants.

Germany

As described above, the licensees generally record and evaluate abnormal occurrences above and below the reporting thresholds in their installations, during maintenance or repair activities or from periodic testing and in-service inspections. These data form the basis for trending analyses. One element of the evaluation process is the search for statistically significant deviations. The German operators not only perform trending analyses for their own plants but share their data with the VGB office and vendors. At the VGB office plant-specific reliability data for probabilistic analyses are derived (Central Reliability and Event Database, ZEDB).

For some issues, e.g. whiskers, there are special databases and trending analyses. On behalf of the federal regulator, further trending is systematically performed by GRS mainly as a prerequisite for probabilistic data and for information of the federal authority. GRS participates on behalf of the federal authority in the NEA database projects.

Japan

JNES has a nuclear safety information data base. NISA and JNES review those events annually and analyse if there are any trending issues both for domestic and overseas events. If any trending issue is identified, regulatory actions will be taken. Recent example is PWSCC at SG hot leg nozzles.

JANTI (Japan Nuclear Technology Institute) has the data base “NUCIA” and is opened to the public on its web-site where relatively minor events not reportable by the laws are also disclosed. Similar trend analysis is done by JANTI as the industries with NUCIA data.

Mexico

The operator performs trending of events. The trending is basically done analyzing the number of events, the type of the events, the frequency and trend of the events. The events can also be classified by

the Areas of LVNPS involved; for example: Operation, Electrical or Mechanical Maintenance, Engineering, Chemistry, and Radiological Protection. These data is classified according to the recurrence they have. There is not a specific methodology used, and the trending does not identify any good practices.

The regulatory body does trending of events in a similar way as the operator. This information is sent as an input for the performance indicator program of the Inspection Department.

The Netherlands

The NPP operator in the Netherlands performs extensive trending. Examples of trend records are:

1. Number of events registered in the work order system due to malfunctioning of components or systems.
2. Number of registered low level-, near miss- and industrial safety events.
3. Number of event reports.
4. Number of events reported to the regulatory body.
5. Distribution of human performance and equipment related aspects of analyzed events.
6. Distribution of equipment related root causes.
7. Distribution of human performance related root causes.
8. Trending of HPES root causes like personnel work practices.
9. Trending of low-level events and near misses.
10. Trending of recurring events.
11. Trending of investigations and corrective actions in progress.
12. Incoming external operating experience documents.

The regulator, at this time, only performs limited trending, although annual reports on NPP operation from 1973 onward have been made.

Slovak Republic

The NPPs have a simple program for trending of all events. Once per year the NPPs evaluate trend of all internal events categories and if necessary additional actions are proposed as a result of this trending. Near misses are trending for similar cause's identification. As a result of this trending plant implements additional corrective actions as well.

Slovenia

The operator performs trending of events. The root causes, contributing causes and possible causes are collected through a Coding process in Corrective Action Program (verbal communications, written procedure and documents, work practices, work schedule,…).

The regulator trends only the number of events.

Sweden

The operator performs trending of events. The trending is basically done analyzing the number of events, the type of the events, the frequency and trend of the events. The events are classified in different areas for example: Operation, Electrical or Mechanical Maintenance, Engineering, Chemistry, and Radiological Protection. There is not a specific methodology used, and the trending does not identify any good practices. The regulator has pointed out to the licensees that they need to start trending on root causes and they are now building different databases for this.

All events of category 1 and 2 that have occurred in the Swedish nuclear programme are included in a regulatory database. Trending can be done of number of events, number of events on a specific system or component or number of events regarding some of the regulatory body's classes.

Switzerland

In 2004, the Inspectorate started the introduction and development of an integrated oversight approach. The basic idea is to integrate all aspects of nuclear safety into a comprehensive oversight strategy. To get a realistic picture of the safety of each installation, the Inspectorate implemented a systematic safety assessment system. For each NPP, the data is summarised in a table. Currently, the inspection findings, the operator licensing results and the results from event analysis are evaluated within the integrated oversight process on an annual basis.

In the future, information from periodic licensee reports, safety indicators and insights from the plant modification authorisation process will also be integrated into the systematic safety assessment system. Each finding of an inspection or result of the analysis of events is assigned to one or several cells of the table. Each direct or indirect cause identified and each safety relevant effect is assigned. Findings are rated on a scale that is based upon the International Nuclear Event Scale (INES). The goal of the scale is to assess all levels of safety performance from good practice to severe accidents on one single scale. A software tool allows displaying safety assessment data. For any period and installation specified all ratings can be displayed in the table. Each rating is linked to the source document. The resulting distribution of ratings is evaluated at the end of the year for each NPP. The result of this evaluation influences the focus of inspections in the following year. The insights from the annual safety assessment of each plant are published in the annual report of the Inspectorate.

United Kingdom

HSE/NII assigns preliminary causal codes to those licensee event reports it considers to have nuclear safety significance in accordance with HSE/NII procedure (http://www.hse.gov.uk/foi/internalops/nsd/bmm/bmmannex8.htm.). On a periodic basis, HSE/NII uses trends based on these causal codes to provide an indication, together with other information, of licensee safety performance. Licensees are expected to carry out their event causal code and any other relevant trending. HSE/NII is looking to utilise licensees' event trending to supplement its own analysis.

HSE/NII is working with industry on the development of safety performance indicators (SPIs) in the areas of "Sustained Excellence of Operation", "Control of Hazards" and "Positive Safety Culture" as measures of licensee nuclear safety performance. A hierarchical SPI framework based on IAEA TECDOC 1141 has been used as the basis for this work. Trending and performance bands for developed SPIs should allow utilisation of a wide range of licensee operating experience by HSE/NII for informing regulatory interventions and for licensees in improving their own nuclear safety performance.

United States

The NRC has a Performance Assessment organization that sponsors our Industry Trends Program (ITP). The ITP uses statistical analysis methods to compare annual industry performance against prediction limits to identify emerging short-term issues. The data and trends are communicated and displayed on the NRC public webpage: http://www.nrc.gov/reactors/operating/oversight/industry-trends.html, and provide a means to confirm that operating reactor safety performance is being maintained by the nuclear industry. Actual plant data is gathered for all of the performance indicator area, and compared to the industry average trends, along with the statistical prediction limits. Any statistically significant trends are identified and reported to the U.S. Congress.

CHAPTER 8: DISSEMINATION OF INFORMATION

Procedures to facilitate dissemination of event information within regulatory body, nationally and internationally

Description of process (if relevant) for provision of information on good practices either nationally or internationally

Canada

To facilitate the distribution of event information to all parts of the CNSC, event reports including all of the analyses, assessments, and coding are input into the CNSC Central Events Reporting and Tracking System (CERTS) as soon as they are received. CNSC staff from all parts of the organisation have immediate access to the information.

In addition, Significant Development Reports (SDRs) on safety significant events or issues are presented to the Canadian Nuclear Safety Commission when public Commission meetings are held.

Highlights of good practices are collected and reported in the CNSC Annual Nuclear Power Plant Report (formerly known as the Annual Industry Report) which is also presented to the Commission in a public meeting. This report is also available on line at: http://www.nuclearsafety.gc.ca/eng/readingroom/reports/powerindustry/index.cfm.

Event information is also distributed nationally through a national industry organisation called the CANDU Owners Group (COG).

Czech Republic

SÚJB is relatively small and compact office and the majority of employees involved in supervision of NPPs safety are members of teams for inspections focused on the licensee's OEF system. Therefore, no specific internal procedures are needed to disseminate information on events in SÚJB. The SÚJB inspection procedure used for inspections focused on the licensee's OEF system requires that all inspection team members should have sufficient knowledge of licensee's OEF system and they also should familiarize themselves with information on events reviewed during a particular inspection. Databases containing OEF data are available for all SÚJB employees on the intranet. Inspection reports from inspections focused on OEF are also available to all SÚJB employees.

SÚJB does not perform any systematic dissemination of OEF information to other organizations. If aspects of some events at NPPs are identified as relevant to non-nuclear industry, SÚJB gives information on these to relevant regulatory bodies.

International dissemination of OEF information is performed mainly through IAEA News and IAEA/NEA IRS. SÚJB informs other regulators on latest developments in domestic OEF and reports information on latest domestic events also under umbrella of bilateral cooperation.

There are no specific arrangements for reporting of good practices in these processes. However, good practices are discussed at bilateral regulatory meetings.

Finland

Resident inspectors follow-up performance and operation of plants on site and inform the management and personnel of STUK about operational disturbances as well as about safety significant events or incidents immediately by phone and by e-mail during office hours and in memo-type weekly reports. Incidents and failures in equipments and systems not having nuclear safety importance, minor deficiencies in periodic tests, and near misses as well as other low level events are normally reported in weekly reports and discussed in weekly and biweekly meetings of expert groups and division heads. Selected events are presented and discussed in department meetings of director, deputy directors, assistant directors and experts of Nuclear Reactor Regulation (NRR). The meeting may decide if deeper inspections or any other actions are required before or after the routine reporting of the licensee. Informing the other licensee in Finland or same type of NPPs in other countries and their regulatory bodies are assessed in the case of common cause failure or similar systems of plants. Reporting to public and into IRS system is decided also in this connection. General principle in IRS-reporting is that experience when led to corrective measures in Finland is shared with others.

Event reports submitted by the licensees are reviewed and assessed by all appropriate experts of the department of Nuclear Reactor Regulation of STUK. On special reports submitted to STUK for approval, experts' memos are required for STUK's decision on the acceptability of the proposed corrective actions for the removal of resolved root causes and other observed deficiencies.

According to the internationally agreed principles, STUK reports on severity classification of significant events to the IAEA within the INES rating system. Requirements concerning the emergency response arrangements and plans are presented in the reformed Nuclear Energy Decree (735/2008) replacing the former Government Decision (397/1991) and in the Guide YVL 7.4. According to Section 8 of the Decree, operator shall notify the local emergency centre and the STUK of an emergency without delay.

France

For events beyond level 1 on the INES scale, information of the public is published on the internet site of ASN.

Every year, a report containing all the safety assessments related to important events is disclosed' inside IRSN. In addition, IRSN report written in the frame of the Advisory Committee for Nuclear Safety devoted to OEF is largely disclosed inside IRSN, ASN and EDF. For the GPR meetings that take place after October 1st, 2008, a synthesis of the IRSN report, the GPR opinion and the ASN corresponding letter are public.

In addition, at the international level, in the frame of bilateral cooperation, exchanges of information on most important events take place with foreign regulators and TSOs.

For events beyond level 2, ASN prepares a press release and a report to the French ministers.

As indicated in Chapter 2, ASN makes a weekly review of events to provide a selection of the most interesting events to French inspectors (about five a week).

Germany

German operators use many different channels for the dissemination of information on operating experience. Their common VGB office serves as a network for the exchange of operating experience and generic information for the German operators and some German design plants abroad. Furthermore, the VGB office interfaces with the WANO reporting system and with the operating experience centre of AREVA NP. Additionally, the operators maintain working groups, where the impact of operating experience on safety is discussed, e.g. the working groups on BWR and PWR, respectively. Within their own organisations, the operators share information on operating experience through internal working groups and regular staff training. For events that are relevant to control room personnel, additional training is performed on plant specific simulators supervised by experienced trainers.

The regional regulators inform other plants under their supervision on events relevant for them, usually combined with additional requirements on the licensee like special investigations. Furthermore the Länder regulators and the federal regulator use the Länder Committee for Nuclear Energy (LAA) to exchange information on OEF. The federal regulator uses information notices prepared by GRS or circular letters to alert all stakeholders (i.e. operators, regulators, vendors, TSOs) to relevant operating experience. The results of in-depth analyses by GRS, e.g. for generic safety issues or precursor analyses, are similarly distributed. International reporting on German operating experience is done by GRS on behalf of the federal regulator through the INES and IRS systems. Furthermore, GRS prepares quarterly and yearly reports on international events. On behalf of the federal regulator, the BfS publishes quarterly reports on reportable events to the public.

Finally, the Reactor Safety Commission (RSK) and its working groups routinely are informed on operating experience either by an operator or by other experts (TÜV, GRS). Important German events are usually presented to the Reactor Safety Commission, thus distributing information on OEF, lessons learnt, and open issues to the German nuclear community. International events that are highly relevant to German plants will be discussed in the Reactor Safety Commission as well. Protocols on the deliberations of the Reactor Safety Commission are sent to all stakeholders.

Japan

As noted in Chapter 1, the transparency of NISA regulation is one of the important codes of conducts.

NISA makes press release of the incidents or failures immediately upon receiving the report from the licensee. The licensee investigates the causes of the occurrence and establishes the countermeasures and/or corrective actions and report to NISA. NISA evaluate the licensee's report if it is acceptable, being advised, if necessary, by the subcommittee members of the Advisory Committee on Nuclear and Industrial Safety, who are experts on operational management, inspection and radiation management. They are translated into English promptly and uploaded to the NISA and JNES websites. At the same time they are distributed to the international and overseas related organizations.

Overseas safety information collected by JNES is reported weekly within NISA and JNES. Items which are important for safety and might require any regulatory actions are reviewed and discussed at the bi-weekly safety information review meeting between NISA and JNES.

Mexico

Operator process

There are specific procedures for event information to other parts of the organization, within the process of OEF. The lessons learned program is part of the training program for the internal operating experience. For external operating experience, the Department of Operational Experience of LVNPS is in charge of gathering all information from diverse sources. For a better scattering of recent external events in the nuclear industry, a selected number of them are translated into Spanish and included in a bulletin of operational experience that is transmitted regularly and is available through the Nuclear Power Plant Division (GCN) electronic system (INTRANET) to the plant personnel. Additionally, the Just In Time (JIT) bulletins from WANO/INPO that are applicable to BWR are translated into Spanish and in accordance with the Nuclear Power Plant Division policy they are discussed in work meetings and used to continuously expand the electronic internal net (INTRANET) with documents in Spanish. The operator participates in WANO programs of OEF for dissemination of its internal operating experience.

Regulatory process

There are not specific procedures to facilitate dissemination of event information. However, every six months, an Operational Experience Report written by AOE personnel is sent to the Performance Indicator Area of the Inspection Department. Furthermore, a digital information process plus a quality assurance program are currently being implemented at the Nuclear Safety Division in order for reliable information to be disseminated to other areas of the Nuclear Safety Division. All information processed by the AOE, related to BWR technology and involving regulatory requirements is sent to LVNPS. Some information, as requested, is sent to the National Institute of Nuclear Research. All information related to BWR technology is available to all Divisions of the regulatory body. The regulatory body participates regularly in the IRS meetings, and provides information of national operating experience.

The Netherlands

Dissemination of OEF information is done mostly electronically since 2006. The national number of recipients of various reports is roughly as follows:

- IRS > 50
- INES > 70
- IRSRR > 10
- NUCNET > 30

Good practices usually are recorded in IAEA mission reports, WANO reviews and group audits. These good practices are at the moment of writing not actively (re) distributed but passively made available in published reports.

Slovak Republic

The NPPs are involved in the WANO OE program and in accordance with it all events which meet WANO criteria for reporting are being sending to the WANO MC.

Regulatory body contributes to the NEA/IAEA Incident Reporting System and uses of the IRS database in OEF program.

Slovenia

The dissemination of OEF information within our organisation and nationally is formalized by an internal procedure. It requires of reviewers/analysts of the event to propose actions how to implement insights gained in the review in-house and on a national level.

International dissemination is achieved by our active participation in international OEF systems (IAEA IRS, OECD/NEA WGOE, EU Clearinghouse), the Slovenian representatives in these systems are tasked with dissemination of our information according to the rules of each system. Also, the information gained from these systems is disseminated by the representatives to interested national stakeholders and, if possible, a direct access to the relevant databases is granted to them.

We do not have in place a formal separate process regarding dissemination of information about good practices.

Sweden

The Swedish Radiation Safety Authority is a relatively small office and all disciplines are represented in the multidisciplinary group that screens all events at the authority.

LER is spread within the industry between operators and to their OEF organisations.

Switzerland

On regulatory level agreements concerning the exchange of information have been signed with Austria, France, Germany and Italy. The German-Swiss Commission for the Safety of Nuclear Installations (DSK), including its working groups, and the French-Swiss Nuclear Safety Commission (CFS) meet annually for consultation, exchange of information and operating experience.

The four CEOs of the Swiss NPPs have initiated and are monitoring the exchange of operating experience between the Swiss NPPs. This group of CEOs is supported by several working groups that deal with issues such as training, nuclear safety performance, surveillance of ageing, management systems, radiological and chemical plant performance, fire brigades and industrial safety.

The inspectorate publishes information on selected events that occurred in Swiss NPPs and on the use of external operating experience information in its annual report.

This information exchange includes also aspects of good practices, but doesn't use a special process.

United Kingdom

For licensee events meeting Ministerial Reporting criteria (see Chapter 2 above), HSE/NII compiles Quarterly Statements of Incidents at Nuclear installations, which are available on its website at http://www.hse.gov.uk/nuclear/quarterly-stat/index.htm." In addition, HSE/NII publishes reports of formal investigations it has conducted of significant licensee events. HSE/NII also has a fast alert system for internal dissemination of significant events reported by licensees.

HSE/NII maintains a database of reportable and other lower level event reports provided by licensees including its evaluation of their nuclear safety significance and trending of event causal codes. This database is available to inspectors. HSE/NII is introducing mandatory training during 2009 for inspectors to disseminate information on a range of issues, including OPEX. HSE/NII issues OPEX briefings to its inspectors based on relevant national or international operating experience to inform regulatory

intervention strategies. In addition, operating experience specific to a particular licensee(s) is highlighted to the relevant inspector. Generic HSE/NII OPEX briefings are communicated to licensees via the Industry OELG or directly by inspectors

HSE/NII also inputs events onto the international operating experience feedback systems as noted in Chapter 2.

United States

The NRC has numerous methods by which event information and other important operating experience is disseminated. Reportable events are entered into NRC's events database and displayed on the public website at: http://www.nrc.gov/reading-rm/doc-collections/event-status/event/en.html. All NRC Generic Communications are also available on the public website. In addition, applicable NRC Generic Communications and Events are sent to the Nuclear Events Web-based System, and the Web-Based Incident Reporting System databases as described in Chapter 2 above. Inspection Reports and performance trends for all NRC licensees are also posted on the public website at: http://www.nrc.gov/reactors/operating/oversight.html.

The NRC's operating experience organization has several internal web-based methods for disseminating lower threshold and pre-decisional information within the agency for early analysis. OpE staff use email and web-postings (OpE COMMunications) to inform internal stakeholders of emerging issues.

CHAPTER 9: REGULATORY USE OF OPERATING EXPERIENCE FEEDBACK

Use of Operating Experience Feedback for different parts of regulatory organisation, e.g., inspection programmes, new build, communication with other organisations, other

Canada

Operating Experience Feedback (OEF) is shared across various groups within the CNSC. Through the review of the CNSC Central Events Reporting and Tracking System (CERTS), CNSC staff has utilised OEF data to provide regulatory guidance for the review of both refurbishment and proposed new build projects. CNSC staff may also review OPEX data trends to identify program areas where regulatory inspection activities could be focused.

Exchange of OEF between organisations is accomplished through the CANDU Owners Group (COG) where event reports from the NPP owners in Canada are discussed and reviewed weekly in joint meetings.

Czech Republic

Use of OEF for inspection programmes:

- OEF databases data and performance indicators values and trends are two of important inputs for SÚJB inspections planning. Information on causes of events, affected systems, delayed and not implemented corrective actions are inputs for inspection plans – higher inspection effort is devoted to "problematic" SSCs, processes and activities.

Use of OEF for new build:

- Currently there is no general philosophy in SÚJB for new build licensing including the use OEF data for new build. However, there are some evident logical steps that will be done, e.g.:

- experience from ETE NPP construction and commissioning will be used as valuable input – OEF database for ETE NPP covers whole commissioning period and significant part of construction period,

- generic managerial issues evident from OEF databases will be discussed with licensee.

Use of OEF for communication with other organizations:

- Currently there is no general philosophy in SÚJB on how to use OEF data for communication with other organizations.

Use of OEF for other purposes:

- There are chapters of SÚJB annual reports discussing level of nuclear safety at NPPs. Sections on licensee's OEF system status are important parts of these.

Finland

STUK complies with the principle of continuous improvement in all fields of nuclear safety: operational activities, modernisation and back-fitting of old plants, design of new facilities, and regulatory oversight. Operating events, both at the Finnish plants and abroad, and the results of research are analyzed and actions for the continuous improvement of safety.

Verification of the implementation of corrective actions is performed in inspections of periodic inspection programme. STUK performs an overall safety assessment of plants in connection of annual review on nuclear safety where the results and findings of regulatory oversight processes (Annex 1; e.g. results of inspection programmes, incidents, event investigations, OEF;) are assessed. Results of the annual safety assessment are presented and discussed with the licensees before publishing in the report to the Ministry of Employment and the Economy. The report is distributed widely to Finnish stakeholders, regulatory bodies, operators and international organisations. The report with its annexes is available on STUK's public website.

The licensee's application for renewal of operating license and for periodic safety review shall contain a report on the actions required in Section 27 of Government Decision 395/1991 and on the consequent plant improvements. When renewal of the operating licence is being applied for, STUK submits a statement on the application to the Ministry of Employment and the Economy, and provides the statement with its own safety assessment. STUK takes a decision of approval on the separate periodic safety review required from the licensee and provides it with STUK's own safety assessment.

France

Inspection programme is mainly based on transversal topics or safety systems. Usually the inspectors include in the inspection the checking of the implementation of corrective actions.

As regards New built, for the EPR design, safety assessment has been carried out by IRSN to check that the designer has correctly taken into account the insights deduced from OEF.

The national and international OEF is frequently used to support the IRSN safety assessment..

In addition, the OEF is used for the verification of the initiating event list taken into account by the PSA. If necessary complementary initiating events are introduce (e.g. the total loss of emergency 6.6 kV bus bars).

Germany

The German operators can use their VGB office and the working group of Nuclear Safety Officers to close the feedback loop. Moreover, under the umbrella of the VGB the operators maintain several dedicated working groups for the exchange and analysis of operating experience. The results of these working groups may lead to actions on the part of the operators.

The regulatory authorities use their insights from reportable events and other licensee reports on operating experience to adapt their supervisory programmes. As a result, there may be targeted inspections by the Länder regulators or additional supervisory requirements on corrective actions may be issued. Finally, operating experience is deliberated on in the Reactor Safety Commission and appropriate reactions of regulator or operator may be recommended by the Commission.

Japan

OEF information is distributed to the related sections of NISA and JNES and they are fed back to the safety management inspections, safety review of the new plants and other regulatory activities.

OEF information, including good practices, is also presented and discussed at the international and domestic meetings and conferences.

Mexico

At the regulatory body, the biannual report written by the AOE personnel includes recommendations to the Inspection Department about the performance of the operator in weak areas that can be subject to a more specific follow up.

At the regulatory body, in the Inspections Department, the OEF is also used to develop performance indicators of LVNPS. Information of OEF (such as IRS reports) is also used, on demand, for inspections purposes.

The use of OEF is a requirement to the operator for the, evaluations of Technical Specifications changes, and, currently, for the evaluation process of Improved Technical Specifications.

The Netherlands

Operational Experience Feedback is highlighted in the annual incident reporting by the regulator to parliament. As described earlier, inspections and audits may be based on specific foreign or domestic incidents that have received more than average exposure. On our web site these reports are available.

Slovak Republic

Repeated events are the most important indicator in OEF process effectiveness evaluation. The NPPs regularly evaluate this indicator and, as a result, additional corrective actions are proposed and implemented.

A second aspect of OEF process is that during last several years, the number of low level reported events has increased and lower number of safety significant events was observed. This fact proves the theory that the solution of small problems can avoid the occurrence of safety problems.

Slovenia

Operating experiences (events, good practices etc.) are evaluated according to the internal procedure. For every event that is reviewed / analysed the analyst has to propose the actions to be taken. These actions include sharing of the insights with other organisations, proposals/action plans for other departments of our organisations, proposals for inspection etc. The analyst is obliged to follow through the implementation of the actions with exception of actions overlapping with other programs/actions/plans that are already underway – in such cases, the actions are joined together.

Sweden

Operating Experience feedback is used for information to management and as a tool for inspection planning.

Switzerland

OEF information is distributed to the related sections of HSK and they are fed back to the safety management inspections, safety review of the new plants and other regulatory activities.

Examples of operational experience information from abroad that lead to major modifications at Swiss NPPs are:

- Based on the Generic Letter 89-10 of the US-NRC, the Inspectorate required a re-evaluation from all Swiss licensees on the functional analysis of motor-operated valves in safety related systems. As a consequence, certain gate valves were modified at each Swiss NPP.

- After the incident in Barsebäck 2 (Sweden) on 28 July 1992, where clogging of the suction line strainers in the suppression pool occurred, the Inspectorate started a programme of short-term actions and measures for resolution of the issue in all NPPs. Short-term actions included inspections and a detailed review of thermal insulation types employed, clogging analysis of the strainers and the preparation of accident management measures for BWR plants. As a result, all emergency core cooling system suction strainers in the BWRs (Mühleberg and Leibstadt) were replaced during their outage periods in 1993 by new equipment with a considerably enlarged strainer area. For the PWRs, backfitting actions were at that time found to be unnecessary. A reassessment of this issue which took place after the release of the latest French and NRC research results revealed that the design of the PWR suction strainers is still appropriate. Nevertheless, one licensee decided to mount new state of the art suction strainers of a cassette type in order to improve safety and to get more flexibility regarding the use of thermal insulation material in the containment.

- Two hydrogen explosions occurred in a European and a Japanese BWR at the end of 2001, which resulted in ruptured pipes. This is a known phenomenon, of which assessments were already made in the past; based on the said events, re-evaluation of these earlier assessments were ordered for the two Swiss BWRs. Improvements with procedures (e.g. filling of empty pipes with water) were immediately implemented. Small hardware modifications (e.g. improved insulation, installation of thermocouples) were made during annual outage. The investigations are not yet finished because other hardware modifications are still under study. However, the impact of hydrogen explosions on the environment is limited and no new "design basis accident" has to be considered.

- The Reactor Vessel Head Corrosion event at the Davis Besse NPP (USA) in 2002, where a significant amount of boric acid corrosion was detected due to leakage through cracks in the nozzles of control rods, has created a centre of high attention in the nuclear community. Swiss operators as well as the Inspectorate were already vigilant to this phenomenon due to previous experience: a small head corrosion event caused by leakage happened in the early 1970's in a Swiss NPP; and also - already 5 years before the said US event was reported - cracks in the control nozzles in US plants had been found and reported. All this previous experience was used by the Inspectorate to define requirements for improved periodic surveillance on nozzles cracks and leakage control by the plant operator. Therefore, the Davis Besse event did not lead to any additional actions.

- The incident at Forsmark 1 NPP (Sweden) which occurred on the 25 July 2006 also led to major investigations by the Inspectorate. HSK checked in detail those aspects which had been identified as being significant for the course of the event. The technical and organisational measures that are in place at the Swiss NPPs in order to deal with the consequences of similar event types were

comprehensively checked. The results of the investigation were published in a specific report which is available at the Inspectorate's website. As result of these investigations, it can be stated that there are no gaps in the technical and organisational precautions implemented in the Swiss NPPs to protect the plants from the effects of grid disturbances. Nevertheless, HSK did recommend that when training shift personnel on the simulator, additional losses of redundancies of safety systems, as well as the loss of information systems and signals in the control room, should be trained periodically.

- In one Swiss Full-Scope-Replica-Simulator, update of the probabilistic earthquake analysis to the state of the art and the adaptation of the inspection programme for the reactor pressure vessel head and bottom penetrations to results from the worldwide operating experience.

The feedback of operational experience into the training process is prescribed in the management systems of the NPPs. ENSI inspects these processes as well as training programmes and the training records at the plant.

United Kingdom

The attached model (Annex 1) shows how OPEX is used within HSE/NII. OPEX includes a range of sources (for example, its own regulatory activity, licensee events and safety performance indicators, international events, new build vendors, non-nuclear etc.) which are screened and evaluated for relevance to HSE/NII. OPEX recommendations, via OPEX briefings, are input to HSE/NII's system of "Regulatory Reviews" which operates at all levels within HSE/NII and makes decisions on regulatory priorities and targeting of resources. In addition, inspectors use OPEX briefings to look at specific safety issues on sites they regulate. OPEX briefings are also promulgated to HSE/NII's "New Reactor Build" Division where relevant issues are considered in assessment of safety documentation provided by Requesting Parties.

United States

Operating Experience (OpE) information is disseminated to other parts of the NRC in several different ways, and it is used for a myriad of purposes. Inspectors in the field often contact OpE staff members to find out what sort of history may be behind an issue they are seeing at their site. The OpE staff will search through the various databases and provide information on past inspection findings, generic communications, etc. to the inspectors in the field. The OpE staff also routinely helps inspectors prepare for PI&R inspections at specific sites by searching for recent issues affecting that particular licensee.

In 2007, the NRC's OpE organization began a "Smart Sample" program. This program is a way for headquarters OpE analysts and technical staff, in conjunction with regional management, to focus resident inspectors at the sites on the latest generic and safety significant trends in OpE. When the OpE staff notice a specific trend or safety issue in their daily Clearinghouse screening processes, the smart sample provides a method for getting the information out to inspectors in the field so that they can see if the issue exists at their site. The smart sample is an optional inspection that the residents can use as part of their baseline inspection process. Any findings made under the smart sample process are reported back to the OpE staff.

NRC's Office of New Reactors (NRO) also has an operating experience staff. Members from the staff attend the daily OpE Clearinghouse meetings, and contribute any insights that may be applicable to new reactor design and construction. Any OpE findings made by the NRO staff are communicated through the same media used by the OpE staff for operating reactors.

The NRC has regular communications with numerous industry organizations including owners groups, the Nuclear Energy Institute, and the Institute for Nuclear Power Operations (INPO). Most OpE information sharing takes place via NRC's Memorandum of Agreement with INPO.

CHAPTER 10: DOCUMENTATION / KNOWLEDGE MANAGEMENT

Storage and maintenance of information on events

Details of knowledge management processes in place on OEF

Canada

Information on events is stored the CNSC database CERTS (Central Events Reporting and Tracking System). Management of the database is described in the documentation of the "Event Review and Follow-up Process" which forms part of the CNSC Operations Compliance Program.

Czech Republic

Databases are used for OEF data storage. The following information is stored in SÚJB database:

- Information from license's databases
  - event ID (event No./year)
  - plant/unit affected
  - date and time of event
  - event title
  - event abstract
  - event description
  - event analysis
  - plant systems related to events (coded)
  - root and direct cause (coded)
  - INES classification
  - basis for INES classification
  - corrective actions (CA) – CA ID, text of CA, status of implementation, required completion time (periodically updated)
  - dates of OEF board meetings

- Information on SÚJB actions
  - SÚJB findings related to the event analysis
  - SÚJB findings related to CA completeness
  - SÚJB findings related to the CA status
  - date of SÚJB review of all above aspects, name of reviewer
  - requirements (enforcement actions) taken as a result of OEF system review
  - issues found as results of events analyses (repeated events, events with higher safety relevance, etc.)
  - communication between SÚJB and licensee during inspections (RAIs and responses)
  - status of events (coded) and corrective actions review in SÚJB

There is no formal knowledge management system implemented in SÚJB. However, information on OEF is available and used by all SÚJB inspectors and relevant managers because of their involvement in inspections, evaluation of their results and preparation of annual reports.

Finland

STUK has a Nuclear Safety Record (YTD) where all the licensees' reports are stored with STUK's decisions and inspection memorandums concerning each report.

Event database (TAPREK) is in principle an NRR's formal tool to review domestic operational events. Anyway, due to the data processing problems no events within latest few years have been able to be taken into the database. The database is also a useful tool to follow the implementation of corrective measures at NPPs, as well as to identify the recurrence of events. Based on the inspection of operational events the department meeting decides the events which should be reviewed and entered in TAPREK database. The 16 pages TAPREK form should be fulfilled during the inspection of an event report if some of the following criteria are met: event is rated INES 1 or higher, event is reported with a Special Report, event is an operational transient with organisational deficiencies or causing major structural or procedural modifications at the plant, and event is associated with multiple or common cause failures in one or more subsystems. The form contains several choices for causes of events, related factors, and responsible organisational units. Also, root causes for the event will be assessed and failed defensive barriers will be evaluated.

STUK has a systematic process for review and utilise IRS-reports and other reports received from foreign regulators or operators. The process according which each IRS-report received through IAEA/NEA WBIRS is assessed is described in STUK's Quality Manual. STUK has an IRS-database of its own where all IRS-reports are stored with the description of an event translated in Finnish. The expert makes justified categorisation of a report based on actions at Finnish plants: 0 = No further actions; 1 = Particular issues need clarification; 2 = Lessons learnt need to be taken account in certain activities; 3 = Actions required; 4 = Good practice in Finland. Summary of actions at Finnish plants are described in Finnish and translated in English for the feedback report.

STUK publishes a quarterly report on the operation of Finnish NPPs (in Finnish). The report is based on information reported to STUK by the licensees (including events) and observations made by STUK during regulatory oversight and inspections. Quarterly reports have been issued since commissioning of the first NPP in Finland i.e. 1977. Reporting criteria for the events and issues to be reported in the quarterly report are: events having safety significance (always INES level 1 or above); special situations which require special report from the licensee (defined according to YVL 1.5); safety significant plant modifications which are based on safety analysis results or on experience from other NPPs; events having public interest. Organisations and Operation Division compiles a list of events each month. Departmental meeting of Nuclear Reactor Regulation decides reporting of events and nominates responsible expert for the text preparation.

Since 1988, STUK has issued an annual report on the regulatory control of nuclear safety in Finland. This report is submitted to the Ministry of Employment and Economy once a year and distributed to other Ministries, research institutes and licensees as well. The report covers the tasks of the STUK's Departments Nuclear Reactor Regulation and Nuclear Waste and Materials Regulation : regulatory control of nuclear facilities, nuclear waste management, non-proliferation of nuclear materials. The content of the report is organized according to STUK's work processes for regulation of nuclear power plants (see process chart as Annex 1). The report describes STUK's oversight of the NPPs and gives a summary of the regulatory control results (Overall safety assessment). Plant operation and operational events as well as safety improvements etc. are described briefly and STUK's regulatory oversight activities are reported accordingly. A complete report of STUK's safety performance indicators for the NPPs is attached as Appendix of the report. The report appendices contain information on completed safety improvements and significant operational events at the Finnish NPPs during the reporting year

STUK started in 2008 a Knowledge Management project "Regulatory decision making in difficult situations" to transfer operating experience and knowledge of experienced inspectors on regulatory methodology and practices to a new generation using selected cases as learning material. Two cases are under consideration. The selected cases are reviewed, using the systematic approach described in the OECD document "Nuclear Regulatory Decision Making". Several other cases with different characteristics of difficult decision making will be analysed and synthesis of these cases will be performed using the systematic approach. As a result of the project, operating experience and tacit knowledge related to selected events are transferred to new inspectors, an OE database will be developed and a new procedure on regulatory decision making will be written for assuring more uniform decisions.

France

French practice: See the chapter 4 for the information stored in SAPHIR and SAPIDE date bases. A knowledge management exists inside IRSN. It is not particular to OEF but common to all the topics related to the safety assessment of nuclear installations

ASN's own database is filled by inspectors and is accessible to all ASN staff.

In ASN's Directorate for NPPs, an OEF Unit is in charge of managing OEF activities. Main missions of this unit are those already described in this document. Other missions concern elaboration of OEF doctrine, support and training to inspectors of the regional agencies of ASN, communication and international relationship. Members of this unit are appointed part-time to it. In the other part of their time, they all are in charge of different fields and topics concerning safety in NPPs (I&C, human factors, aging, radioprotection, environment, fuel handling, civil engineering, circuits, …), that is a way for providing different views and competences for monitoring safety.

Germany

The storage of information on events by the licensee is regulated by the guideline on Requirements on the Documentation for Nuclear Power Plants, issued 5th August 1982, and the technical rule on the Documentation during Construction and Operation of Nuclear Power Plants (KTA 1404). The licensee is required to keep information on reportable events until the end of life of the plant. This also applies to deviating results of periodic tests or in-service inspections and the reasons for changes in the operating or test manual. Since the implementation of computerised plant management systems electronic information on all kinds of occurrences is collected by the operator. Furthermore, the VGB office and AREVA NP run independent databases on events reported to them.

On behalf of the federal regulator, the BfS maintains a national database for all reportable events and publishes quarterly reports on reportable events. Furthermore, GRS has developed on behalf of the federal regulator a comprehensive database containing all reportable events and available additional technical information, expertises and analysis results.

Japan

JNES has a safety information data base system which includes OEF data, both domestic and overseas. It could be accessed from the related sections of NISA and JNES and also from the local inspection offices of NISA and JNES. Therefore, the regulators can easily access the OEF data. We do not yet have any knowledge management system of OEF, but we are now evaluating to introduce it.

Mexico

The operator process uses digital technology for storage and maintenance of all information related to OEF. This information can be easily accessed by plant personnel through the INTRANET system. All safety related information is managed under the quality assurance program and the documentation, in paper, is stored in a conditioned documentation room. There is not yet any knowledge management process in place regarding OEF.

The regulatory body is currently in the process of using digital technology for storage and maintenance of all information related to OEF. All information of OEF is filed and kept under the management of the AOE personnel. Currently, a quality assurance program is being implanted at the Nuclear Safety Division, which cover the documentation generated and received. There is not yet any knowledge management process in place regarding OEF.8

The Netherlands

An electronic database is maintained since 1988. Annual incident reports are made since 1973. Reports to parliament are made since 1980. Knowledge management is currently being developed because of a bare necessity. The generation of regulatory pioneers has departed already and the post WW II baby boomers are about to depart.

Slovak Republic

The regulatory body has a database for storage, tracking and document of events reported in accordance with Regulation No. 48/2006 Coll. on details of notification of operational events and events during shipment, as well as details of investigation of their reasons. The electronic copies are stored in database of events on NPPs on the territory of the Slovak republic. The database has simple access for data as events description, causes, corrective actions etc.

The NPPs have a database for storage, tracking, and documents of all internal reported events. Hard copies of all events are stored in special archives for the whole plant lifetime.

Slovenia

Information on events occurring within Slovenia is stored and maintained as "archival" documentation (permanently stored). Additionally, information on such events is also stored and presented in user friendly intranet form. Information about screened international events (and the corresponding screening) is stored in user friendly intranet form.

Sweden

All events that have occurred in the Swedish nuclear power programme are stored in a database called STAGBAS.

Switzerland

Some national databases are used for OEF data storage. The following information is stored in the ENSI-HERIS database and GEKO database: Information from licensees , event ID, plant/unit affected, date and time of event, event title, event abstract, event description, event analysis, plant systems related to events, root and direct cause, INES classification, corrective actions, status of implementation, required completion time. In the HERIS database there is also a coding of event causes according to the IRS guideline.

The ENSI systematic safety assessment system, described in Chapter 7, is used as a kind of knowledge management system, which integrates all aspects of nuclear safety into a comprehensive oversight strategy.

United Kingdom

Publicly available information on Ministerially Reportable events and formal HSE/NII investigations is available on the HSE/NII Website. OPEX source material (including licensee event reports, HSE/NII inspection/investigation reports, international OPEX), outcome of HSE/NII OPEX screening , OPEX briefings etc are stored within an internal Electronic Document and Records Management System which is accessible to all HSE/NII staff.

United States

Publicly available Operating Experience information is displayed on the NRC website: www.nrc.gov. This includes Event Reports, Inspection Reports, Industry Trends Program data, Part 21 Reports, Generic Issues, Generic Communications, Preliminary Notifications, Plant Status, and Morning Reports. This information is also stored either in agency databases or in the Agency-wide Documents Access and Management System (ADAMS) on a permanent basis.

Pre-decisional or internal information, such as OpE COMMunications and Issues for Resolution are stored and organized in an internal database. Daily OpE Clearinghouse team notes are emailed to technical staff and management who have signed up for this distribution. In addition, the OpE staff is pursuing a database solution for storing and coding the lower level OpE information that is distributed via these daily notes.

The NRC has an agency-wide qualification program in place, with specific modules and study guides for achievement of the "Operating Experience Engineer" qualification. Qualifying staff members must get

a qualification sheet signed off by other more senior staff, and then face an oral qualification board chaired by a mid-level manager in order to get qualified. In addition, the OpE organization is actively pursuing a knowledge management process. Senior staff routinely share their expertise in various areas with all OpE staff members. Another initiative that the OpE staff pursues is a quarterly teleconference with our regional office counterparts to exchange data and ideas.

ANNEX 1 – SUPPORTING INFORMATION

Czech Republic

1. Atomic Act (Act No. 18/1997 coll.) requires:

- §4
  - (2) Whoever utilises nuclear energy or performs radiation practices or interventions to reduce natural exposure or exposure due to radiation accidents must ensure that his or her action is justified by the benefits outweighing the risks arising or liable to arise from these activities.
  - (3) Whoever performs practices related to nuclear energy utilisation or radiation practices shall proceed in such manner that nuclear safety and radiation protection is ensured as a matter of priority.
  - (8) Any person performing or providing for practices related to nuclear energy utilisation or radiation practices, must have implemented quality assurance system to the extent and in the manner set out in an implementing regulation, aimed at achieving the required quality of a relevant item.
- §17 A licensee under Article 9 (1) shall, besides other obligations established in law
  - b) assess in a systematic and comprehensive manner the fulfilment of conditions set in Article 4, from the aspect of the current level of science and technology, and ensure that the assessment results are put into practice;
  - c) comply with the conditions of the licence issued by the Office, proceed in accordance with approved documentation and investigate, without delay, any breach of such conditions or procedures and take remedial measures and measures to prevent repetition of such situations. Any case when exposure limits or limits for safe operation of a nuclear installation have been exceeded or violated shall be reported to the Office without delay;
  - d) comply with technical and organisational conditions for safe operation of nuclear installations, ionising radiation sources and workplaces with ionising radiation source as laid down in an implementing regulations, comply with the approved quality assurance programme and adhere to specific requirements for uniformity and correctness of measurements and measuring devices to the extent laid down in an implementing regulation;
- §18 A licensee shall also:

- a) monitor, measure, evaluate, verify and record values, parameters and facts with an impact on nuclear safety, radiation protection, physical protection and emergency preparedness, to the extent laid down in an implementing regulations;

- §4 of Atomic Act is implemented through the Regulation No. 132/2008 Coll.

- (Regulation of the State Office for Nuclear Safety on Quality Assurance in Activities Related to the Utilization of Nuclear Energy and in Radiation Practices, and Laying Down Criteria for the Assignment and Categorization of Classified Equipment into Safety Classes) which requires the following:

- §8 Handling of non-conformances, corrective and preventive actions

- (1) Processes and activities, and their inputs or outputs (products) that are not in conformance with documented requirements (non-conforming items) are subject to the process of control of non-conformances).

- (2) Process of control of non-conformances shall be performed in compliance with the general requirements for processes (§6 of regulation) and in compliance with documented procedure for resolution of non-conformances, which shall define:

  - a) requirements for identification of non-conforming item immediately after its detection and for its recording

  - b) requirements for reporting of non-conformances to appropriate persons

  - c) methods of non-conformances resolution and requirements to prevent use of non-conforming item, including the plan for resolution of non-conformance, and

  - d) requirements for assessment of non-conformance consequences and potential other consequences to the nuclear safety and radiation protection

- (3) The following actions must be performed in accordance with written procedure for control of non conformance to remedy those:

  - a) examination of non conformance

  - b) cause analysis

  - c) determination of manner of non conformance solution

  - d) evaluation of the need of measures to prevent repetition of non conformance

  - e) determination, documentation and implementation of corrective actions commensurate to the consequences of non conformance

- (4) Requirements for preventive measures (not cited).

Note: All events are considered to be non-conformances and thus all above cited requirements or Regulation No. 132/2008 Coll. are valid.

- §17 of Atomic Act is implemented (also) through the Regulation No. 106/1998 Coll., (Regulation of the State Office for Nuclear Safety on Nuclear Safety and Radiation Protection Assurance during Commissioning and Operation of Nuclear Facilities) which requires the following:

- § 3- General Requirements on Assurance of Nuclear Safety and of Radiation Protection

  - (1) Nuclear Installation is only commissioned or operated in the modes considered by the safety reports according to the programs of commissioning or according to the operation procedures and in accordance with the limits and conditions of safe operation (§ 2, ad t) of the Law), approved by the State Office for the Nuclear Safety (further on only "the Office"). In the case of origin of divergence from the procedural course, during the situation hazardous from the viewpoint of nuclear safety in the course of performance of tests during the installation commissioning or during its operation, it is necessary to carry out the indispensable manipulations and measures so that the nuclear installation ought to be actuated without delay into the safe, stabilized and control state. In the case of origin of such situation it is possible to continue in the commissioning or in the operation after the clarification and removal of causes that resulted to the origin of such situation.

- § 4

  - (1) Documentation for Commissioning and Operation

  - Since the beginning of the nuclear installation commissioning and continuously during the whole time of its operation there are especially recorded the following facts important from the viewpoint of nuclear safety and radiation protection:

  - g) the existing and newly originated failures of equipment and their propagation, the transient states and the jump changes of parameters with the aim to assure in accordance with the special Regulation [1)] the possibility of determination of ageing of selected equipment and of its residual service life,

- § 14 - Principles of Operation of Nuclear Installation

  - (5) Further the licensee ensures:

  - d) the regular evaluation of operation and analyses of failures originated and the transmission of reports dealing with these analyses to the Office at least once a month, together with the proposals on the measures and with the information on the state of fulfilment of these measures.

Criteria for domestic events operator reporting to SÚJB are defined in the top level "Agreement on exchange information on events" signed by chair of SÚJB and by ČEZ manager responsible for nuclear safety (hereinafter Agreement). Based on this Agreement, all licensee event reports are transmitted to SÚJB local inspectorates through daily logs which are used on both NPP sites.

SÚJB local inspectors are responsible for assessment of completeness of operator's reporting. If a situation requiring preparation of LER occurs and LER is not prepared, i.e. requirements of above mentioned Agreement are not complied with; resident inspectors require preparation of LER through daily log or through inspection report.

Criteria on preparation of LERs are defined in licensee's internal document describing OEF as follows:

Events and nonconforming items included in licensee OEF program:

- NPP transients, malfunctions, failures and degradation of SSCs,
- events with impact to nuclear safety or reliability of NPP,
- events with impact to radiation protection
- events with impact to conventional safety
- events with impact to environment
- event with impact to transport or storage of nuclear fuel
- fires, earthquakes, floods, explosions.

Each other event, experience or nonconforming item can be included in the OEF program if safety manager, plant manager, head of nuclear safety department, operations manager, shift supervisor or any other line manager considers as important to perform cause analysis and implementation of corrective actions to ensure safe and reliable NPP operation.

Reporting criteria for events that are required to be further analyzed in licensee's OEF system are defined in Appendix 3 to the above mentioned Agreement as follows:

Appendix 3 - Reporting on incident assessments

Incidents assessed by the operational experience feedback system of the nuclear power plant

- a) from nuclear safety perspective:
  - activation of protection and safety systems, including their spurious initiation
  - activation of reactor limitation systems, pressure relief systems, including their spurious operation,
  - unscheduled drop of reactor power higher than 10% of nominal power (due to changes in technological parameters of the reactor core or the primary circuit, a technical defect of the NSSS equipment, personnel activity or other external influence)
  - unscheduled drop of reactor power than 40% of nominal power (due to changes in technological parameters of the secondary circuit (BOP), a technical defect of the BOP equipment, personnel activity or other external influence),
  - malfunctions of limited SSCs, resulting from incorrect handling, SSCs failure or damage, during which OLCs are utilized due to a change in the equipment operating efficiency, non-fulfilment of a specified function or a change in parameters in such way that the corrective action must be carried out during the next morning shift at the latest,

- necessity to change the OLCs operational mode due to SSCs inoperability, exceeding technological parameters, not complying with the time to carry out a specified activity or violation of limits and conditions,

- unsuccessful SSCs test or check according to the OLCs during the period (mode) of LCOs validity or during the block start-up or shut down, requiring re-test due to failure to comply with the success criteria,

- faults of equipment essential for safe refuelling,

- loss or disruption of heat dissipation from the reactor core

- incidents effecting the reactor core reactivity control,

- violation of any barrier against fission product leak,

- CRD drop (at EDU NPP a drop of more than 50 cm is also considered as an CRD drop), or CRD drop (at ETE NPP a drop by more than 5 steps is considered as an CRD drop),

- forced interruption of zero power and power ascension tests, including the condition, where all scheduled tests cannot be implicitly evaluated,

- non-conformances, errors and mistakes discovered during the operation, maintenance, or limited SSCs check leading to inoperability, or radioactive leak, if these are not rectified by the operative personnel or if a safety or operating instruction is not issued to remedy them, or if a technical solution of non-conformance is not issued,

- occurrence of a dangerous nuclear situation on reactor shutdown - foreign objects in the primary circuit, including the steam generator secondary side, overflow of the parting planes.

- b) from radiation protection (RP) perspective, nuclear material (NM) handling:

  - incidence of doses, contamination or other quantities in radiation protection exceeding the incidence levels stated in the approved monitoring programs (RWP plants),

  - capture of persons or materials at the entrance or exit, that are so contaminated that the capture signalling system of a particular power station is activated,

  - failure of and/or damage to the radiation control equipment, the operability of which must be ensured under the operating conditions that have arisen and/or in the event of a safety requirement,

  - radiation incidents with repeated or multiple incidence of human factor,

  - errors when handling spent fuel or radioactive material or a container of fresh or spent fuel,

  - loss, theft or other uncontrolled relocation of JM, RAO or radioactive contaminated material

  - damage to NM and/or to packaging facility with NM,

  - failure of both the operating and backup lighting of the reactor chamber lasting longer than 10 minutes.

- c) from the perspective of physical protection (PP) and emergency planning
  - inadvertent crossing or an attempt to disrupt the PP system barrier and incidents reducing efficiency of this system,
  - extraordinary events announcement and assembly of emergency staff.
- d) other:
  - fire, flood, explosion, earthquake or other emergency incident inside the nuclear installation guarded area,
  - incidents classified by the external OEF as relevant for the NPPs,
  - incidents classified as the category of incidents assessed by the operational experience feedback system of the NPP safety manager or plant manager,
  - repeated technological failures on SSCs (excluding component failure during their anticipated life within the project failure rate),
  - serious pollution and damage to the environment due to the NPP operation (environmental accident),
  - serious injury of personnel linked to the technological cause.

There are no specific guides related to the OEF issued by SÚJB with the exception of INES Manual.

International OEF

Reporting of domestic events to international OEF systems:

- Czech Republic reports do IRS based on membership in this system. IRS reporting criteria are used. Operator uses WANO network in a similar way.
- Use of external information:
- Both operator and regulator have internal procedures describing handling of external events. Operator use as sources WANO, IRS, IAEA News and other public sources of information. Regulator uses mainly IAEA/NEA IRS and IAEA News as sources of information.

2. Introduction to Czech regulatory body SÚJB

The Czech regulatory body (SÚJB) consists of approximately 200 staff members.

SÚJB's mandate is defined in the Atomic Act.

The SÚJB is a regulatory body responsible for governmental administration and supervision in the fields of uses of nuclear energy and radiation and of radiation protection.

- State supervision of nuclear safety of nuclear facilities, nuclear items, physical protection of nuclear facilities, radiation protection, and emergency preparedness of nuclear facilities and workplaces handling ionizing radiation sources.

- Licensing of activities as specified by Act. No. 18/1997, e.g. for the siting and operation of nuclear facilities and workplaces handling very significant ionizing radiation sources, for handling ionizing radiation sources and radioactive wastes, transportation of nuclear materials and radionuclide emitters

- Reviewing and approving documentation related to nuclear safety and radiation protection as laid down by the Atomic Act, limits and conditions for the operation of nuclear facilities, ways to ensure physical protection, emergency rules for the transport of nuclear materials and selected radionuclide emitters, and internal emergency plants of nuclear facilities and workplaces handling ionizing radiation sources.

- Specifying conditions and requirements for radiation protection of the public and personnel handling ionizing radiation sources (e.g. laying down limits and defining controlled zone s), specifying emergency planning zones and licensees' emergency preparedness requirements under the Atomic Act.

- Monitoring the status of exposure of the public and personnel handling ionizing radiation sources.

- Coordination of activities of the Radiation Monitoring Network in the Czech Republic and international exchange of radiation situation data.

- Managing the national system of nuclear materials accountancy and control, national record-keeping systems for licensees, selected import and export items, ionizing radiation sources, and exposure of the public and personnel handling ionizing radiation sources.

- - Professional cooperation with the International Atomic Energy Agency.

- - Providing relevant radioactive waste management information to municipalities and district administration bodies and relevant information concerning the results of activities of the SÚJB to the Government of the the Czech Republic.

The SÚJB is a regulatory body responsible for governmental administration and supervision in the field of chemical weapons prohibition according to Act. No. 19/1997 Coll. as amended in Act. No. 249/2000 Coll.

The SÚJB establishes the National body in the field of biological (bacteriological) and toxic weapons prohibition according the governmental Decision No.306/2000.

3. Status of Nuclear facilities Operations in Czech Republic

The main operator of nuclear-energetic reactors in Czech Republic is ČEZ, a.s., who operates nuclear power plants in Dukovany and Temelín sites. Both Dukovany and Temelín NPP are constructed according to Russian projects as VVER type. Dukovany NPP operates 4 VVER 440 units providing 1760 MW electrical power. First unit was put in operation in 1985. Temelín NPP is equipped by 2 VVER 1000 units providing 2000 MW electrical power. Both units started commercial operation by the end of 2004 (commissioning begun in 2000).

Within Dukovany NPP area there are two more nuclear facilities: Interim spent fuel storage and Spent fuel storage. All spent fuel produced in NPP Dukovany reactors is stored in specially constructed and approved packages (CASTOR type). Temelín NPP area includes Fresh fuel storage part and Spent fuel storage is planned to be constructed.

Two research reactors LVR-15 a LR-0 are operated in Research institute in Řež (ÚJV, a.s.) and educational reactor VR-1 in Nuclear Faculty of ČVUT (FJFI ČVUT) are supervised as nuclear facilities. High level waste repository is located in the area of ÚJV Řež.

Radioactive waste repositories (RWR) are included into nuclear facilities that are operated by state established organization Radioactive Waste Repository Authority (RAWRA). RWR Dukovany is used for NPP radwaste collected from both Czech NPPs. Richard mining by Litoměřice town is used as RWR. So-called institutional radioactive waste has been disposed there. At this site is operated newly reconstructed facility for examination of transport packages.

4. Resident inspectors in Czech

There are resident inspectors at both NPP sites

- Head of local inspetorate, 4 nuclear safety inspectors and 2 industrial safety inspectors at NPP Dukovany
- Head of local inspectorate, 2 nuclear safety inspectors and 2 industrial safety inspectors at NPP Dukovany

5. Periodical regulatory inspections in Czech

There is no team dedicated to OEF within SÚJB. SÚJB verifies licensees' OEF systems during periodical regulatory inspections. For these inspections, team of inspectors-specialists is dedicated.

- In the 2008, SÚJB staff devoted to these inspections approximately 120 man days.
- One SÚJB staff member is responsible for IOEF (INES, IRS, IAEA News).

Sweden

The Swedish Nuclear Power Inspectorate's Regulatory Code 2004:1" which outline the general regulations. The regulations concerning OEF are as follows:

Chapter 2. Basic safety provisions

Handling of deficiencies in barriers and in defence-in-depth

3 § If a deficiency is observed or if there is reason to suspect that there is a deficiency in a barrier or in the defence-in-depth system, measures shall be taken to the extent and within the time necessary, depending on the severity of the deficiency. For this purpose, the deficiencies shall be evaluated, classified and investigated without delay. Taking into account the degree of severity, the deficiencies shall be classified in accordance with Appendix 1.

Appendix 1

Category 1

Observed deficiencies in one or more barriers or in the defence-in-depth system as well as a well-founded suspicion that safety is severely threatened shall be classified as Category 1.

The following events or conditions shall be assigned to Category 1:

1.1 exceeding the highest permissible limit (HTG), in accordance with the definition provided in the Operational Limits and Conditions,

1.2 a deterioration in the integrity of any of the barriers for the containment of radioactive materials, such as:

- a nuclear fuel damage which results in an extensive release of fission products to the reactor coolant,
- damage to the primary system pressure boundary which results in the activation of the facility's safety functions,
- damage to the reactor containment which means that the containment does not fulfil the postulated leak tightness and structural integrity requirements in the safety report,

1.3 an unplanned reactivity increase in a reactor, or unintentional criticality in a reactor, or criticality in areas where nuclear material is handled, stored or kept,

1.4 a deficiency in an activity, management or control which is of such an extent that it severely threatens safety,

1.5 a deficiency or deviation of such a severe nature or extent that it gives cause to question the safety report of the facility,

1.6 an event or deficiency in the physical protection which is of such a nature or extent that it is a severe threat to safety.

Category 2

Observed deficiencies in one barrier or in the defence-in-depth system which are less severe than that which is referred to in Category 1, as well as a well founded suspicion that safety is threatened, shall be classified as Category 2.

The following events or conditions shall be assigned to Category 2:

2.1 a deviation from the Operational Limits and Conditions which is within the assumptions and conditions of the safety report,

2.2 a deviation from specified system or component performance,

2.3 a condition which results in operational limitations or in limitations on the duration of operation. However, this does not include planned measures which are specified in the Operational Limits and Conditions,

2.4 a condition which has prevented or could have prevented the intended functioning of equipment which is of importance for safety,

2.5 the limit for the activation of the safety function is observed to result in a lower margin to the safety limit than specified in the safety report,

2.6 a nuclear fuel damage which entails damage to the cladding or other damage of the fuel pin which results in releases of radioactivity or mechanical damage to components, geometric deformation or another condition which may make a fuel bundle unsuitable for continued operation. However, this does not include fuel which is being investigated in a special research or materials testing reactor,

2.7 a condition in the facility which results in nuclear material occurring in equipment which is not approved for this,

2.8 a condition in the facility which means that a substance with moderating properties is present, to a greater extent than that postulated during normal operation, in a component or equipment where moderation control is necessary,

2.9 a deficiency of importance for safety in a single analysis in the safety report or in a method used for such analysis,

2.10 another technical or organizational condition which threatens safety,

2.11 an event or deficiency in physical protection which threatens safety.

Category 3

A temporary deficiency in the defence-in-depth system which arises when such an event or condition is corrected and which, without measures, could lead to a more severe condition and which is documented in the Operational Limits and Conditions in accordance with Chapter 5. 1 §.

An event or condition assigned to Category 3 may not prevent the function of the facility but indicates the need for measures or testing since there is a risk that the component or system will not fulfil requirements concerning readiness for operation in accordance with the Operational Limits and Conditions. However, the time for the measures may not exceed the analyzed permissible repair time specified in the Operational Limits and Conditions. For Category 3 to apply, the event or condition has to be of such a nature that immediate measures are not warranted.

Handling of deficiencies in barriers and in defence-in-depth (continuing)

4 § When a category 1 deficiency in accordance with Appendix 1 has been observed, or if there is reason to suspect such a deficiency, the facility shall be brought to a safe state without delay. Before the facility may be allowed to return from a safe state to operations without special limitations, a safety review in accordance with Chapter 4. 3 § shall be conducted of the investigations conducted and the measures taken as a result of the deficiency, and such investigations and measures shall be reviewed and approved by the Swedish Nuclear Power Inspectorate.

5 § When a category 2 deficiency in accordance with Appendix 1 has been observed, or when there is reason to suspect such a deficiency, the facility may continue in operation during the time that corrective action is taken. In connection with this, the necessary limitations or controls to maintain safety shall be observed. If corrective action, in accordance with the first paragraph, can be taken within the allowed repair time, in accordance with the Operational Limits and Conditions, the facility may be returned to operations without special limitations after the measures have been taken and readiness for operation has been checked.

A safety review in accordance with Chapter 4. 3 § shall subsequently confirm that the safety margins of the facility have been restored through the measures taken. In those cases where conditions for corrective action are not specified in the Operational Limits and Conditions, the facility may not be returned to operations without special limitations until corrective action has been taken, and a safety review in accordance with Chapter 4. 3 § has confirmed that the safety margins are restored. If it should be found during the investigation of the deficiency that the deficiency is of a more severe type than covered by the category 2 classification or that there is significant uncertainty concerning the safety margins, the deficiency shall be re-classified as category 1 and the measures that are then necessary shall be taken without delay.

6 § In the event of a category 3 deficiency in accordance with Appendix 1, the facility may continue in operation with the limitations that are necessary to maintain safety, taking into account the deficiency, during the time that corrective action is taken. Before measures are taken as a result of the deficiency, a safety review of the time and means of implementing the measures shall be performed in accordance with Chapter 4. 3 §.

Organization, management and control of the nuclear activity

§ point 7 The licensee shall ensure that experience of importance for safety from the facility's own and from similar activities is continuously utilized and communicated to the personnel concerned.

Chapter 4. Assessment and reporting of the safety of facilities

Safety review

3 § A safety review in accordance with the provisions of these regulations shall be performed in order to verify that applicable safety aspects have been taken into account and that applicable safety requirements with respect to the design, performance and organization of the facility are met. The review rules, such as industrial standards, that the licensee, in addition, applies to the facility. shall be performed in a comprehensive and systematic manner and shall be documented.

The safety review shall be performed in two stages. The first stage, the primary review, shall be performed within the parts of the facility's organization that are responsible for the specific issue. The second stage, the independent safety review, shall be performed within a safety review function appointed for this purpose, which shall have an independent position relative to the parts of the organization which are responsible for the specific issues.

Chapter 5. Operation of the facility

Investigation of events and conditions

4 § Such an investigation as required by Chapter 2. 3§, or performed for other safety-related reasons, shall be conducted in a systematic manner. As far as possible and reasonable, the investigation shall determine the sequence and causes of an event or the causes of another demonstrated safety deficiency as

well as establish the measures needed to restore the facility's safety margins and to prevent the recurrence of safety deficiencies.

The results of investigations in accordance with the first paragraph shall be communicated to the personnel concerned at the facility and shall be used to develop the safety of the facility. Furthermore, the results shall be reported to the Swedish Nuclear Power Inspectorate in accordance with the provisions of Chapter 7. 1-3 §§.

Chapter 7. Reporting of events and conditions to the Swedish Nuclear Power Inspectorate

1 § Events which have occurred and conditions which are detected which have an essential impact on the safety of a facility shall, without delay, be reported to the Swedish Nuclear Power Inspectorate in the manner described in **Appendix 4.**

2 § Events which have occurred and conditions which are detected which are of a less severe nature than mentioned in 1 § but of importance for the safety of the facility shall as soon as possible be reported to the Swedish Nuclear Power Inspectorate in accordance with **Appendix 4.**

3 § Routine reports concerning the operational state and concerning activities which are of importance for the safety of the facility shall be submitted in accordance with **Appendix 4.**

Appendix 4

Reporting in accordance with Chapter 7. 1 §

1. The following shall be reported without delay:

- an event or condition which causes an alarm for increased preparedness or accident in accordance with the alarm criteria which have been established by the Swedish Radiation Protection Authority,
- an event or condition which belongs to Category 1 in accordance with Appendix 1,
- a scram in a reactor facility where expected consequential functions of importance for safety have failed.

The Swedish Nuclear Power Inspectorate shall, in these cases, be informed within one hour after the event or condition has occurred or the condition has been detected.

The following information shall be reported to the Swedish Nuclear Power Inspectorate when such an event or condition has occurred:

- what has occurred,
- when it occurred,
- which immediate consequences it has resulted in,
- which actions have been taken,
- which actions are planned,

- an assessment of the continued development.

Follow-up reports shall be submitted in the event of any essential change in the safety state or when a new assessment is made of the continued development.

2. The following shall be reported within 16 hours:

- an event or condition which, in accordance with the applicable technical criteria, is classified as Level 2 or higher on the International Nuclear Event Scale (INES).

3. The following shall be reported within 7 days:

- a comprehensive report on any event or condition which has resulted in an alert in accordance with point 1 above or which has been assigned to Category 1 in accordance with Appendix 1. Such a report shall contain:

- a description of the event and event sequence

- a preliminary analysis of causes and consequences as well as an assessment of the importance of the event for safety

- measures that have been taken and are planned to restore the safety margins and to prevent a recurrence

Minutes or corresponding statements of undertaken safety reviews shall be attached to the report.

Reporting in accordance with Chapter 7. 2 §

4. Within 30 days the following shall be reported:

- a comprehensive report on any event or condition which has been assigned to Category 2 in accordance with Appendix 1,

- an event or condition that is assigned to Level 1 on the International Nuclear Event Scale (INES),

- a scram report for a reactor facility.

If particular grounds exist which mean that a final report in accordance with the first paragraph cannot be submitted within 30 days, a preliminary report shall be submitted to the Swedish Nuclear Power Inspectorate. This report shall also contain a justification of the particular grounds and a fixed time-schedule specifying when a final report can be ready. A safety review of such a justification and time-schedule shall be carried out in accordance with Chapter 4. 3 §.

In addition to the reporting of events and conditions, SKI's Regulations (SKIFS 2000:2) concerning Mechanical Components in Certain Nuclear Facilities contain requirements on the special reporting of damage that has occurred.

Reporting in accordance with Chapter 7. 3 §

5. A nuclear power reactor shall submit the following report every day (daily report):

- operational state during the day,
- thermal power level in percent,
- event or condition of Category 1, 2 or 3 that has occurred,
- abnormal operation, for example the activation of the reactor protection system,
- other circumstances which may be of importance for safety.

6. Other facilities shall submit the following report every week (weekly report):

- abnormal operation,
- event or condition of Category 1, 2 or 3 that has occurred,
- other circumstances which may be of importance for safety.

7. The following report shall be submitted every year (annual report):

- an integrated report of activities at the facility during the calendar year with experience gained and conclusions reached with regard to safety.

Events or conditions which have been assigned to Categories 1, 2 or 3 or which have resulted in reactor scram shall also be included in the report. Conditions which have been assigned to Category 3 shall also be described with respect to the purpose of the measures and the time utilized to implement the measures (prevention time). The annual report shall be submitted to the Swedish Nuclear Power Inspectorate no later than March 1, the following year.

General Recommendations

Such general recommendations on the application of regulations which specify how someone can or should act in a certain respect. Comments on Certain Paragraphs.

Chapter 2. 3 §

The requirements regarding investigating and taking measures, when there is a deficiency in a barrier or in the defence-in-depth system, also apply in the event of a suspicion that safety is threatened which is based on performed safety analyses as well as on events which have occurred and on conditions detected at other similar facilities. The degree of severity of the failure type or deficiency as such, the possible safety impact that it may have as well as the safety impact in the particular case in question, should be determined by the investigation.

The requirement regarding taking a measure without delay means that it must be taken as soon as the necessary basis for the measure is available.

Chapter 2. 4 §, Appendix 1

Point 1.2: Damage as a result of dryout is an example of damage that can lead to an extensive release of fission products and nuclear material to the reactor coolant.

Point 1.3: When deciding which unplanned reactivity increase in the reactor should be assigned to Category 1, reactivity increases which are greater than half of the average value of the delayed neutrons in the core may provide guidance. A lower unplanned reactivity increase, or if the event is included in the safety report of the facility, may be assigned to Category 2.

Point 1.5: Such a deficiency or deviation may have been identified through an event, investigation, analysis or other experience which has emerged at the facility itself or at another similar facility. Fuel bending, which can prevent control rods from being inserted into the core, is an example of a deficiency that is of such a serious nature that the safety report of the facility can be called into question.

Chapter 2. 5 §, Appendix 1

Point 2.6: When such a nuclear fuel defect occurs which can lead to difficulties in detecting new damage or the release of uranium to the primary system which makes testing and maintenance difficult or if the quantity of alpha activity in the operational waste from the facility exceeds the acceptable limit for nuclear waste disposal, the reactor should be shut down as soon as possible and suitable and the damaged fuel should be removed from the core.

Chapter 2. 9 §

Point 7: Efficient procedures should exist for continuous experience feedback within the nuclear activity. In the light of experience gained, it should be continuously investigated whether the facility and its activities comply with the applicable conditions and regulations.

Chapter 4. 3 §

The safety review should comprise a review of technical factors as well as a review of the man-technology-organization interaction. Thus, personnel with adequate technical competence within the areas in question as well as personnel with competence in behavioural sciences should participate in the review work. Personnel working with the independent safety review should have such knowledge and experience that they can independently assess the matters that are submitted for review.

The primary safety review should be as comprehensive as possible and should not take into account that an independent review is also being conducted. The following questions should normally be included in a primary safety review:

- that the motive for implementing a measure is acceptable from the standpoint of safety,
- that presumptions and delimitations as well as input data for analyses, investigations and modifications are correct or reasonable, as well as that standards and other rules cited are suitable for the case in question,
- that the methods used, the analysis and calculation models, are verified and qualified or well tested, that they are applicable in the case in question and that they have been applied within their possibilities and limitations,
- that the analysis, investigation or calculation results are correct, that the measures are suitable from the standpoint of safety and that they can be conducted in the intended manner and with sufficient quality, as well as that proposals for measures in response to events that have occurred or conditions that have been detected are such that they prevent a recurrence, and

- that the measures are at least leading to maintaining, and preferably improving, safety.

The independent safety review should, in the light of how an issue has been handled within the responsible parts of the organizations, check that the issue has been handled in a correct manner from the standpoint of safety. The aim is not to repeat the primary safety review, although it may be necessary to repeat some part of it. Furthermore, a broader perspective should be used than that applied in the primary review. The independent safety review should therefore take into account

- whether the issue in question has been correctly handled,
- whether the conclusions drawn and proposals reported have been factually
- supported in a correct manner,
- whether applicable safety aspects, including physical protection, have been taken into account and whether applicable safety requirements are

met, and

- whether measures adopted are leading to maintaining safety or increased safety.

The independent safety review thereby comprises both the quality of the handling of the case and a factual assessment of the case. The independent function for safety review should be given a sufficiently strong and independent position in the organization with the authority to report directly to the facility's highest manager. Furthermore, its personnel should not participate in work on analyses or investigations of issues as long as such work is being handled within the responsible organizational parts.

Chapter 5. 4 § Investigation of events and conditions

Events that have occurred and conditions of importance for safety should be systematically investigated so that the event sequence is completely clear, including the circumstances that could have prevented or stopped the event progression, so that the consequences are determined, the underlying causes are investigated and well-founded measures are specified in order to prevent similar events, conditions or deficiencies from occurring again.

In this context, systematic means that the investigation must be carried out in a logical manner with a documented methodology, clearly documented results and must contain conclusions for safety which are based on the results obtained. The investigation methodology should be such that all aspects and circumstances are taken into account, technical as well as those relating to the interaction man-technology-organization.

Chapter 7. 1-3 §§, Appendix 4

Reporting in accordance with 1 §

In order for the Swedish Nuclear Power Inspectorate to be notified within one hour, the Inspectorate maintains constant preparedness through an on-duty decision-maker.

Events and conditions which are within the scope of the "International Nuclear Event Scale" (INES), are described in the International Atomic Energy Agency's (IAEA) and the Nuclear Energy Agency's

(NEA)14 document: ”INES: The International Nuclear Event Scale – User’s Manual”. The manual describes how the events are to be classified and what a report should contain.

Reporting within 16 hours of events which are assigned to INES Level 2 or higher is required for the Swedish Nuclear Power Inspectorate to be able to confirm the classification and to report, in its turn, to the IAEA within 24 hours after the event has occurred, in accordance with the agreement that has been signed between Sweden and the IAEA.

Reporting in accordance with 2 §

These reports should primarily contain an informative description of the event sequence and of the operational consequences, assessments of the importance for safety and of the root causes as well as a description of measures implemented and planned in order to prevent a recurrence. The report should further contain information on the experience which has been gained on the basis of what has occurred, as well as the conclusions of the safety review of the investigation which has been carried out at the facility.

An integrated report can be submitted when any of the following occurs or is detected during a planned nuclear reactor shutdown

- single earth fault,

- instrument instability and unstable setting detected during calibration,

- containment isolation valve leakage exceeding the stipulated total leakage15.

The integrated report should describe the individual events and should contain an integrated analysis and evaluation of the failure type they represent. Nuclear fuel damages, which require the dismantling of the fuel to investigate root causes, may be examples of special reasons not to submit a final report in 30 days. However, in such cases, the final reporting should be conducted as soon as the results from the investigations are available.

Reporting in accordance with 3 §

In addition to a report of experience and conclusions from the standpoint of safety, the annual report of a reactor facility should contain a summary of the following:

a. operating experience and events and conditions which have been assigned to Categories 1, 2 or 3 in accordance with Appendix 1

b. production data,

c. core and fuel conditions and criticality safety issues,

d. hydrochemical conditions,

e. planned and unplanned outages as well as a report on the completed refuelling outage,

f. repairs in equipment of importance for safety,

g. modifications to the facility design as well as to the organization, management and control of the nuclear activity,

h. expert tasks and service work conducted within the nuclear activity which have been contracted out,

i. changes in competence requirements and training programmes which are caused by changes in the facility and its activity as well as a summary of planned and conducted training for personnel with tasks of importance for safety in the nuclear activity,

j. investigations and analyses performed, the results of which are expected to affect the conditions specified in the safety report,

k. production, storage, transport from as well as final disposal within the facility, of nuclear waste and information on material that has been given clearance,

l. experience from the physical protection of the facility.

With respect to other facilities, the report should contain the above information to the extent applicable.

Annual reporting which is required by other regulations and licence conditions issued by the Swedish Nuclear Power Inspectorate can either be submitted separately or included in the above-mentioned annual report.