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WORKING MATERIAL

REGULATORY GOOD PRACTICES RELATING TO INSPECTION AND ENFORCEMENT

A COMPILATION OF THE 1989/90 PEER GROUP DISCUSSION CONSIDERATIONS AS THEY RELATE TO OPERATIONAL PLANTS

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FOREWORD

In 1974 the IAEA established a special Nuclear Safety Standards (NUSS) programme under which 5 Codes and 55 Safety Guides have been produced in the areas of Governmental Organization, Siting, Design, Operation and Quality Assurance. The NUSS Codes and Guides are a collection of basic and derived requirements for the safety of nuclear power plants with thermal neutron reactors. They have been developed in a complex manner which ensured the best possible international consensus.

This broad consensus is one of the reasons for a relatively general wording of the main principles and is sometimes a cause of problems in their application to the detailed design of nuclear power plants. The requirements, particularly those of the Codes, often need interpretation when applied to specific cases. In many areas national regulations and technical standards are available, but often even these do not answer all questions and only the practice used in applying certain rules fully reflects the outcome of the detailed consideration given to solving individual cases.

In order to present further information on the application and interpretation in the NUSS Codes and Safety Guides, the preparation of a series of Safety Practice publications has been initiated. It is hoped that many Member States will be able to benefit from the experience presented in these documents.

It is hoped that this publication will be useful for regulators and will also provide information for operating organizations. The document is a compilation of the reports of all of the 1989/90 Peer Group discussions held to consider regulatory inspection and enforcement of good practices. Therefore names of participated countries or the situation of regulatory practices reflect those at time when discussions took place. It identifies those common regulatory features which require continuous reinforcement and the examples of good regulatory practices which were recommended by the senior regulators attending the Peer Group discussions.

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1. INTRODUCTION

1.1. BACKGROUND

The Agency's programme for the establishment of Nuclear Safety Standards (NUSS) for land based nuclear power plants with thermal neutron reactors resulted in the development of 5 Safety Standards (Codes on the Safety of Nuclear Power Plants) in the areas of:

- Governmental Organization
- Siting
- Design
- Operation
- Quality Assurance.

Each code sets out basic requirements for the safety of nuclear power plants under appropriate headings and contains the main philosophy, objectives and principles which are considered essential for safety. The procedure for their development ensures that the practices of all Member States are taken into consideration. Seven safety guides in the governmental organization area are currently available to describe acceptable methods of implementing specific aspects of that code. The list of titles of all NUSS documents is given at the end of this publication.

In 1986, at a Special Session of the IAEA General Conference, it was suggested that the Agency could play a role in assisting Member States in the enhancement of their regulatory practices with the objective of increasing confidence of the international community in the safety of nuclear power programmes. Following this, and subsequent related international meetings, the Agency sent out IAEA Questionnaires on "Regulatory Practices in Member States with Nuclear Power Programmes" and on "Inspection and Enforcement by the Regulatory Body for Nuclear Power Plants". Summaries of the results of analyses of replies to these questionnaires were issued respectively as IAEA-TECDOC-485 (October 1988) and IAEA-TECDOC-589 (March 1991).

Following the issue of the first summary report the Nuclear Safety Standards Advisory Group (NUSSAG) recommended in 1989 that, to promote the sharing of experience through increased professional contacts between nuclear safety regulators, a system should be provided for the identification of commonly accepted good practices and to disseminate them widely among Member States.

In 1989 and 1990, to comply with the first part of this proposal, the Agency established a series of Peer Group meetings at which senior regulators from not more than 3 or 4 countries discussed and compared experiences on regulatory inspection and enforcement, and identified good practices.

The participants in these meeting groups were respectively Sweden, USSR and UK (5-7 December 1989); GDR, FRG and Netherlands (14-16 February 1990); Canada, France and Spain (4-6 April 1990) and Belgium, Czechoslovakia, Finland and Switzerland (11-13 June 1990). See the attached list of contributors to the meetings.

In order to fulfil the second part of the proposal, each of the individual group reports produced by the IAEA has been reviewed and incorporated into this Safety Practices document for dissemination amongst Member States.

1.2 OBJECTIVE

The purpose of this publication is to provide a compilation of the 1989/90 Peer Group discussion considerations as they relate to operational plant.

1.3 SCOPE

In developing this document the discussions of practices of the 13 countries participating in this round of Peer Group discussions have been taken into account. The document is a synopsis of 'best practices' and those regulatory features requiring continuous reinforcement identified by the senior regulators attending the Peer Group discussions. Therefore names of participated countries or the situation of regulatory practices reflect those at time when discussions took place. Where different groups have made similar statements these have been combined to express best the consensus opinion. Examples of 'best practices' are given, where possible, with due note being taken of differing national regulatory regimes.

1.4 STRUCTURE

The document is structured to express in two Sections the common regulatory features which those senior regulators present identified as requiring continuous reinforcement and the examples of good practices which were recommended by those senior regulators during discussions.

The first Section relates largely to practices specified in the Government Organization Safety Code and Guides [50-C-G(Rev.1) and (50-SG-G1 to G9)], and where applicable references to these documents are made. The points are restated in this document because senior regulators emphasized the particular needs for their continuous reinforcement.

The second Section contains the examples of good practices, identifying where possible particular examples of national practices.

2. COMMON REGULATORY FEATURES IDENTIFIED AS REQUIRING CONTINUOUS REINFORCEMENT

The common regulatory features identified as requiring continuous reinforcement listed below[1] have not necessarily been considered by every Peer Group but each feature was considered by at least two groups and the majority by more than two groups. Similar statements from different groups have been combined to express the consensus opinion and therefore there may be minor differences in their applicability to any particular country. However, their common philosophy and understanding were clearly identified by the participants throughout the discussions.

2.1. The structure and approach of the regulatory organization in any country should be consistent with

- the existing legal and constitutional system,
- the nuclear power programme structure, development and organization, and
- the prevalent industrial and economic situation.

It was considered that no single model of a regulatory approach could be universally applicable, although different national approaches could be used to achieve similar goals.

[This is consistent with and further emphasises the provisions of Safety Code 50-C-G(Rev.1) Sections 401 to 409 and Safety Code 50-C-0(Rev.1) Sections 201 to 206.]

[1] The order in which the items are stated is not intended to imply any recommendation as to their relative importance or suggest any priority for consideration.

2.2. The regulatory regime should be such that responsibility for nuclear safety resides with the operating organization/licensee. The regulatory body should

- define the acceptable levels of safety,
- monitor to ensure that the licensee fulfils their safety responsibilities,
- reassess safety levels and ensure that the licensee continuously strives to improve safety, and
- impose controls to ensure the achievement of improved safety.

[These considerations underline the provisions of Safety Code 50-C-G(Rev.1) Sections 301 to 314.]

2.3. The influence of the licensee's management organization, attitude and performance on plant safety should be fully recognised. A system for identifying and rectifying operational deficiencies should be built into the licensee's management structure.

There is a need to identify the effects of any management problem that may have contributed to an identified regulatory inspection finding. Deficiencies found by regulatory inspection should in the first instance be considered as a licensee's management failure.

In order to successfully monitor the operating organization's management structure and arrangements it is necessary to ensure that a good dialogue is maintained between them and the regulatory body together with an atmosphere of mutual confidence and respect.

The detailed solution to any identified problem must remain the responsibility of the licensee, the regulatory body should limit itself to indicating relevant constraints.

[This re-emphasizes elements of Safety Code 50-C-G(Rev.1) Sections 1004 and 1005 and various Sections of Safety Code 50-C-O(Rev.1) which identify the responsibility of the operating organization/licensee for management of safety.]

2.4. The regulatory body should establish a structured system for evaluating and systematically following up all inspection findings, whether these are routine findings or reported events. The results of inspections should be formalised by a protocol, letter or report shortly following the inspection. The inspection results should be evaluated, and where appropriate, any underlying causes identified for subsequent follow-up action.

[The points made here refer to the objectives for regulatory inspection and enforcement which are addressed in Safety Code 50-C-G(Rev.1) Section 1005 and Safety Guide 50-SG-G4 Sections 2.2 and 6.1.]

2.5. The regulatory body should establish any necessary co-ordination arrangements with other organizations whose responsibilities relate to nuclear safety e.g. those organizations responsible for radiation protection, pressure retaining components, fire protection, environmental protection etc., to ensure an overall integrated approach to plant safety.

[This draws attention to specific items addressed in Safety Code 50-C-G(Rev.1) Sections 425 to 427.]

2.6. Staff employed by the regulatory body should be suitably experienced, qualified, trained and remunerated to ensure their status and enable a professional dialogue between the operating organization/licensee's staff and the inspectors.

Particular levels of experience, qualifications or training will vary between different countries and between the different roles played by the individual inspectors in that country. Generally, however, it was expected that qualifications should be at technical college (diploma) or university degree relevant engineering or scientific disciplines; that previous experience should be pertinent to the work of a nuclear inspector and training should be a mixture of courses and 'on the job' training with experienced inspectors.

[This reflects the provisions of Safety Guides 50-SG-G1 Section 4 and 50-SG-G4 Section 2.4.2.]

2.7. Site Inspectors should be allocated to one or more designated plants by the regulatory body. Whether these Inspectors are resident on the plant or not varies between countries, however it was emphasized that, whichever approach is used, they should maintain a professional detachment as regards plant performance and problems in carrying out their duties.

The Site Inspectors should be supported where needed by specialists who may be other Inspectors, headquarters assessors or outside consultants specialized in particular fields of technology. Such specialists may be employed both for direct inspection and for subsequent evaluation of inspection findings as appropriate.

[These comments emphasize the provisions in Safety Guide 50-SG-G4 Sections 2.6. and 4.2.]

2.8. The regulatory body should establish a graded response (enforcement policy) to identified deficiencies in the operating organizations' plant, documentation or management systems. Typically this response should proceed from low level discussions with plant management or written requests for explanations, through such stages as restrictions on operations or amending licence conditions, and only culminating in legal action, licence suspension or financial penalties as a last resort. Mutual agreement should be reached at the lowest level possible commensurate with the importance to safety of the identified deficiency.

[These comments emphasize the criteria for methods of enforcement identified in Safety Guide 50-SG-G4 Section 7.2.]

2.9. A regulatory inspection programme should be developed to audit issues of safety significance and thereby provide an overview of the licensees' compliance with the safety requirements. Such a programme would include regular inspections but also have built-in allowances for reactive inspections in particular situations such as incidents. When determining a specific plant inspection programme the operational experience of that plant should be taken into consideration and it should be recognised that there is not necessarily any sharp dividing line between safety and non-safety related equipment

and processes. The depth of attention paid by any inspection should be determined by the relative importance to safety of the item involved.

Inspection guidelines are also necessary to ensure that the programmed inspections are carried out in a systematic and consistent fashion. Such guidelines need to retain any flexibility built into the programme to permit inspectors to respond as necessary to particular needs and situations.

[These points draw together the provisions in Safety Guide 50-SG-G4 Sections 3.1. and 4.4.]

2.10. The designated Site Inspector(s) should have freedom of access to all plant, equipment, documentation and personnel. This access should, however, recognise that the operating organizations' management, usually at plant level, remains the primary channel for obtaining information. Such access should not unnecessarily interfere with plant operations or the work of individuals.

[The emphasis on accessability reflects Safety Guide 50-SG-G4 Section 5.2.1.]

2.11. The authority of the regulatory body should extend to such issues as:

- requiring their consent before the licensee carries out important plant activities,
- requiring periodic plant reassessments (not too frequent, to allow for an in-depth review; a periodicity of ten years seems a good compromise), and
- the power to require the licensee to effect personnel changes where necessary.

[Such authorities may be encompassed either in statutory legislation or in particular plant licences as appropriate but they broadly re-iterate the provisions of Safety Code 50-C-G(Rev.1) Sections 804 to 813, Safety Guide 50-SG-01 Section 5.1 and Safety Guide 50-SG-04.]

3. EXAMPLES OF GOOD REGULATORY PRACTICES

The examples of good regulatory practices listed below [1] are not necessarily used in all countries participating in the Peer Group discussions. They were, however, recommended by the participants to the specific meeting at which the item was discussed. Whilst the majority of the good practices were raised in two or more Peer Group discussions, and therefore in this Section are expressed as a combination of the consensus opinion, some good practices have been put forward by only one Group. However, all inputs from all Groups have been included for consideration.

Particular examples of 'good practices', where appropriate, are noted with each item. These are extracts from the submissions made by each country as background notes for the Peer Group discussions and are not necessarily proposed as best solutions.

3.1. In each country there should be a clear separation between those organizations dedicated to the promotion of nuclear power and those bodies responsible for regulating the safety of nuclear power.

This is a clear re-statement of the provision in Safety Code 50-C-G(Rev.1) Section 302, an example of this can be seen in the Peer Group submission by the United Kingdom.

[1] The order in which the items are stated is not intended to imply any recommendation as to their relative importance or suggest any priority for consideration or implementation.

"In the United Kingdom no site may be used for the purpose of installing or operating any civil nuclear installation unless a nuclear site licence has been granted by the Health and Safety Executive (HSE). HM Nuclear Installations Inspectorate (NII) is responsible for carrying out this licensing function, by delegated authority from HSE.

HSE is an independent body, established by Law, reporting to the Health and Safety Commission (HSC). HSC reports to the Secretary of State for Employment on all health and safety issues although it will advise the Secretary of State for Energy if necessary on safety matters. The Government Department responsible for nuclear power is the Department of Energy.

The regulatory system in the UK thus provides for the effective independence of the regulatory body from the governing departments that promote nuclear energy."

3.2. Licensees should be required to establish a safety review system such as a safety committee, independent from production pressures, to provide advice on any matter significantly effecting safety.

The German Federal Government has prepared a regulation which calls for assigning a Nuclear Safety Commissioner for each nuclear power plant. This individual is to be involved in all safety related projects, e.g. evaluation of reportable events and incidents, evaluation of incidents from other plants, plant modifications, revision of the plant operations manual and other safety related documents. The Nuclear Safety Commissioner is reporting directly to the plant manager and thus independent from all other departments of the plant organization. Although this regulation has not yet put into force, most of the utilities have already assigned this position.

In the Netherlands every nuclear power plant has two advisory bodies; an Internal Reactor Safety Committee and an External Reactor Safety Committee (ERSC). ERSC is to provide independent review and surveillance of the functioning of all internal safety control and safety evaluation provisions within the operating organization.

Internal Reactor Safety Committee (IRSC)

A reviewing body within the plant management structure to evaluate and review all matters important to nuclear safety and radiological protection. The IRSC advises and reports to the plant management and reports also to the External Reactor Safety Committee. The terms of reference, function, authority and composition of this committee are subject to approval by the regulatory body.

External Reactor Safety Committee (ERSC)

A committee under responsibility of the operating organization to provide independent review and surveillance of the functioning of all internal safety control and safety evaluation provisions within the operating organization such as quality assurance, Internal Reactor Safety Committee, plant management and structure of the operating

organization. In addition, the ERSC may evaluate and review matters important to nuclear safety and radiological protection. The ERSC advises and reports to the operating organization. The terms of reference, function, authority and composition of this committee are subject to approval by the regulatory body.

It is understood that such systems are employed in UK, Belgium, Finland, France and Spain.

3.3. The regulatory body should establish inspection guidelines to ensure a systematic and consistent approach to plant inspection. These guidelines should allow sufficient flexibility for inspectors to take the initiative in identifying and addressing new concerns as they arise.

This recommendation re-iterates the points made in Section 2.9. above. An example of this practice is given in the Peer Group submission by France where the manual describing 'Inspection procedures or directives' is outlined -

"The inspection manual comprises:

- a general note describing the framework in which inspections are to take place and stipulating directives for:
  - * definition of inspection programmes
  - * inspections notifications addressed to plant operators
  - * drafting rapid reports
  - * drafting inspection reports
  - * document issue
- a general guide on how the inspection should be carried out.
- specific guides on routine inspection procedures:
  - * civil works quality
  - * startup tests
  - * pre-fuelling inspection
  - * pre-criticality inspection
  - * systematic in-service inspection
  - * refuelling inspection
  - * welded construction quality
  - * site radiation surveillance
  - * very cold conditions including freezing
  - * organization in the event of an emergency
  - * supervision of PWR periodic tests.

These guides are currently being updated.

Directives:

The inspectors are free to organize the inspections they perform according to the methods and techniques they deem best adapted to the topics encountered following duly considered in depth preparation."

3.4. Site Inspectors should be allocated to plants in such a way that they retain maximum independence from the operating organization being inspected. For example, where resident inspectors are used then more than one should be co-located at a site for mutual support and they should also be regularly involved in reviews/audits at other plants to maintain a broad perspective. Similarly, inspectors recruited from licensee staff should not immediately be assigned to plants where they have had recent experience until training in regulatory practices has been assimilated.

This is understood to reflect the practices used in many of the countries attending the Peer Group discussions. Canada maintains resident inspectors at each of its reactor sites. The number of inspectors varies between three and nine depending on the number of reactors on the site. Many resident inspectors are relatively senior personnel, who develop a very detailed knowledge of the operation of the site's reactors. In order to ensure consistent and independent levels of inspection at each site, Canada has taken a number of actions to rationalize, and bring under procedural control, the elements of compliance inspection. In particular, a program of exchange inspections has been initiated. In this program, resident inspectors perform inspections at each of the other reactor sites. This permits the 'calibration' of inspectors to common, independent, standards.

3.5. The regulatory body should ensure that there is a formal programme for Inspectors to receive suitable training on joining and to give opportunities at later stages for retraining. The programme should include, as appropriate,

- introductory courses,
- residency at and/or study of a nuclear plant,
- simulator training (to give an understanding of plant and shift operator behaviour),
- on the job training accompanying experienced Inspectors,
- training in other (non-nuclear and foreign nuclear) regulatory bodies, and
- specialisation retraining courses,

and should be flexibly structured to take account of the Inspectors' previous experience and background.

Examples of Inspector training were given in the Peer Group submission by the Netherlands, the Federal Republic of Germany and Belgium.

For the Netherlands - "The first-line inspectors [generalists] must have bachelor degrees or equivalent and a minimum of 3 to 4 years relevant experience in the industry or otherwise. Their training programme includes elements such as:

a) a basic course in nuclear engineering. The course comprises of nuclear physics (including reactor and health physics) and reactor technology (including basic simulator training). Duration: 6 weeks,
b) spend some introductory weeks at nuclear power plants (2 to 3 weeks),
c) accompanying the experienced inspectors on-the-job (about 10 times),
d) self study and internal training regarding the organization of the regulatory body and its legal role (continuous process),
e) in addition:
   (i) simulator training (5 working-days over a period of 2 weeks),
   (ii) course in advanced health physics (24 working-days over a period of 8 months),
   (iii) visits to a nuclear power plant in another country (2 or 3 weeks),
   (iv) QA course (1 week),
   (v) personal effectivity training course (1 week).

Note: Element a) and e)(ii) are concluded by written examinations.

The second-line inspectors [specialists] must have a master degree or equivalent. In addition to the elements a), b), d), e)(i) and e)(v) of the training programme of the first-line inspectors, they follow advanced courses in their field of expertise".

For Germany: "The inspectors of the regulatory body are in possession of university degree (e.g. diploma, PhD, state examination) in areas such as engineering, physics, chemical engineering, law and have several years of practical experience in industry, in licensing and supervising bodies, in research centres, with technical expert organizations or with other relevant institutions.

Personnel of technical expert organizations who are contracted as authorized experts by the regulatory body for the review and assessment of licensing documents and for on site testing and inspection activities hold university degrees in technical fields or technical engineering degrees.

The inspectors are trained and educated in professional courses, symposia, conventions, workshops, simulator training courses and, as guests, during actual operation of nuclear facilities, and by exchange of experience."

In Belgium, the following qualification and training program for the plant inspectors of the regulatory body is required:

1. Qualification
   - Legal licence by Ministries (Expert Class 1)
   - Academic degree in Engineering or Physics
   - Nuclear academic degree or equivalent nuclear experience
   - Radiation protection experience

2. Additional initial training
   - Preferably a few years of experience in a safety analysis team
   - Knowledge of NPP systems and specifications
   - Functional process in NPP (2 weeks)
   - Simulator training (6 weeks)
   - Special radiation protection training (2-4 weeks)
   - Training in a working NPP abroad (8-12 weeks)
   - Belgian law and NPP licences

3. Retraining
   - Radiation protection (internal)
   - Simulator (1 week/year)
   - Specific nuclear analysis tools

3.6. Regulatory bodies should establish a system to evaluate periodically inspection findings, identify generic issues and make arrangements enabling inspectors from various plants, locations or projects to meet to exchange views and discuss the findings and issues.

A typical example of the practice of inspection evaluation was given in the Peer Group submission by Sweden:

"Systematic Evaluation of Inspection Reports

1. Programme for evaluation of routine inspection reports to evaluate licensee performance and identify trends
   - Inspection reports are evaluated at weekly meetings
   - Trend identification is analysed at different departments at SKI [Swedish Nuclear Power Inspectorate]. There is a group called ASK which is responsible for initiating special investigations.

2. Evaluation of time allowed for corrective actions (statistics of average time for corrective action implementation).

The allowed time for implementation of corrective actions is entirely dependent on the safety significance of the subject and the possible time for "doing the job".

3. Evaluation of root-causes of inspection findings and follow up action to correct them.

In the cases where root-causes are looked for, this will always be done by our specialist organization together with the inspectors.

4. Compiling statistics of inspection findings by area (operation, maintenance, etc), by cause (material failure, operator error, design problem etc), by system (reactor, instrumentation, balance of plant etc.).

Inspection findings are regularly discussed among inspectors. A weekly screening is also performed by the ASK-group. Here also the event reports from the utilities according to the requirements in the Technical Specifications are screened. The event reports are collected in a database from which statistics on e.g. causes, affected components etc. can be extracted. SKI issues reports based on this database.

For certain systems or components, analysis of trends of failure reports are made, for example when inspectors find information indicating that problems could be at hand."

In Germany, arrangements for this mutual information and evaluation are made on different levels:

1. Inspectors of the federal state authorities regularly meet to exchange experience, identify generic issues and discuss inspection findings. These meetings are conducted by the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety and are carried out in various commissions and working groups.

2. Incident reports from the German NPPs as well as from foreign plants are compiled by a federal authority, evaluated in depth by the GRS (Gesellschaft für Reaktorsicherheit) and made available to all state authorities and utilities.

3. Major incidents and inspection findings or generic issues lead to a special evaluation by the GRS in order to encourage state regulators and utilities to further evaluate the significance of a special event to the individual NPP.

4. Major incidents and inspection findings are discussed in the Reactor Safety Commission (RSK), the advisory board of the Federal Minister for the Environment, Nature Conservation and Nuclear Safety. These discussions involve the state authorities, their expert organizations (TÜV) and the utilities. Measures for correction and avoidance of similar events or findings are discussed.

3.7. Dialogue between the regulatory body and the operating organization should be structured to ensure that the Site Inspector is used as the focal point for regulatory questions and issues relating to the plant.

The Inspector should ensure that inspection activities, including necessary inspections of manufacturers, suppliers and subcontractors, is directed through the licensee. At the end of an inspection visit any informal dialogues to discuss plant conditions should be concluded by a formal discussion between the Inspector and a suitable representative of the licensees' plant management.

In addition there should be regular meetings between senior licensee representatives and regulatory officials to discuss plant safety status as identified by the inspection activities.

Examples of this interface between regulator and licensee were given in the submission by the United Kingdom and Germany.

For the United Kingdom the 'modus operandi' of the site inspector was described:

"Compliance with licence conditions is monitored by a site inspector. There is usually one designated site inspector for each major installation. In the case of smaller installations (research reactors, fuel stores etc.), one inspector will be responsible for inspecting several plants. Generally, site inspectors plan to spend about 25 per cent of their time on site, in routine visits of 2/3 days duration. This will include special inspections, for example quality assurance audits, reactor start-up inspections after biennial shutdown and incident investigations. Site inspection requires some 35 per cent of NII's inspectors. The inspectors are expected to liaise and discuss findings at all levels of plant management and with operations staff. The site inspectors are complemented and supported by teams of assessors who work on safety aspects of designs from pre-licensing through to decommissioning. Site inspectors thus act as a focal point within the Inspectorate for all issues affecting the site, using their experience and professional judgement to call on specialist assessment expertise as and when required."

In Germany:

"A group of inspectors is responsible for supervising one plant. Onsite visits at the plant take place on the average of about once a week. Contacts are made at different levels: generally the plant director, the responsible shift supervisor and the head of the radiological protection staff are the first involved, often the section heads but also the division heads. The inspectors have the right to visit the plant at any time without announcement. The access procedures are the same as for the operating personnel."

3.8. There is a need to assess the licensees' management and organizational adequacy in addition to assessments of the plant technical state. However it is recognised that no standards exist to permit objective evaluation.

Management and organizational deficiencies unfortunately are usually identified only through their consequences and therefore there is a need to promote a strong safety culture within the operating organization.

The regulatory body can assist in developing this safety culture by emphasising positive corrective action in preference to a system of punishment. Typically the regulator should establish measures to ensure that the licensee takes corrective actions

in a timely fashion, taking fully into account the safety significance of the deficiency and the complexity of the correction.

Enforcement should be graded to reflect the safety significance of any deficiency and the regulator can, for example, establish suitable controls by limiting or restricting plant operations or by making effective use of authorizations on whether to restart after plant shutdowns. If further steps prove necessary then legal or monetary penalties should only be considered for deliberate violations of safety rules or limits and such penalties should be imposed on the operating organization rather than to individuals.

It was considered that penalties do not in themselves resolve the root of the problem causing the deficiency. These root causes need to be considered separately and assurances that similar problems will not arise again may be best provided by enhancing the management safety culture.

A statement of aims presented by Germany outlines the approach:

"Possible Enforcement Actions (letters, warnings, suspension of activities/license, penalties, court procedures) and Correspondent Severity Level.

A number of graduated executive measures are available to the nuclear supervisory authority for achieving the goals described above and for implementing the regulatory requirements, likewise described. These are, essentially:

(1) supervisory decisions within the power of the authorities supervising the implementation of the licensing provisions,
(2) oral or written supervisory orders and authorizations,
(3) dispositions with regard to the preparation of decisions by the licensing authority
   - for the promulgation of additional licensing provisions,
   - for the withdrawal or revocation of licences.
(4) legal pursuit of any irregular or illegal actions,
(5) preparations for taking legal actions under criminal law."

Later in the same section it is noted that one of the instruments for achieving the supervisory goals and implementing the supervisory requirements is -

"Working towards a self-imposed commitment by the operating organization to follow the goals and meeting the requirements of the supervisory authority in connection with the corresponding applications for changing the plant design or its operation prior to issuance of the supervisory decision."

3.9. The regulatory body should, as part of its inspection arrangements, conduct quality assurance audits of manufacturers, suppliers and sub-contractors to the operating organization to check their qualification for nuclear work.

An example of such inspection arrangements was given in the submission by the USSR:

The main statutory duties of the USSR State Committee for the Supervision of Nuclear Power Safety (SCSNPS) [now superseded by the State Committee for the Supervision of Industrial and Nuclear Power Safety (SCSINPS)] includes -

"- supervision of quality assurance in fabrication of equipment for all nuclear power facilities as well as special quality control (technical acceptance) for NPPs, including equipment fabricated in CMEA member states and Yugoslavia for NPPs built in the USSR and abroad with technical assistance from the Soviet Union;

- monitoring the quality of construction of NPPs and the assembly of equipment."

3.10. A computerised database should be provided incorporating information on national and international safety related events. This could be used as a source for further analysis and development of lessons learnt for the international programme.

Such a computerized database is being developed by Sweden, the details of which are outlined in the paper "Experience from Screening and Analysis of Safety Related Events at Swedish Nuclear Power Plants" by Nilsson and Andermo presented at the IAEA/OECD-NEA Symposium on 'Feedback of Operational Safety Experience from Nuclear Power Plants' in Paris, 16-20 May 1988 and reprinted as IAEA-SM-302/40.

The 'Abstract' of this paper says -

"Improving safety by collecting and disseminating information from safety related events, both from Swedish and foreign nuclear power plants, has been practised at the Swedish Nuclear Power Inspectorate since at least 1974. Analyses have been carried out and utilized for different isolated purposes. Not until recently, however, has a more interdisciplinary oriented and systematic effort been possible. Screening of domestic Licensee Event Reports and reports of foreign origin, and subsequent analysis of the selected events, are performed in a systematic way. Both the screening group and the different project groups consist of persons from different departments and with different skills. Experience from one and a half years of work with these project groups is presented."

3.11. Effective co-operation should be established between regulatory bodies, both bilaterally and internationally. This is particularly important in countries having a small nuclear programme and in countries where reactor technology is largely imported.

This is understood to be the practice of many of the countries attending the Peer Group discussions.

In common with other countries, Canada maintains a number of co-operative agreements with other regulators. Of particular interest is the support given to Korea

and Romania, where Canadian designed reactors are either operating or under construction. This support has included secondment of AECB inspectors to the Korean regulatory authorities under the auspices of the IAEA Expert Programme, and the training of Korean and Romanian regulatory personnel. These activities are seen as beneficial to all the involved countries, both in terms of the safety philosophy transferred, and experience gained by Canadian staff.

Regulatory bodies of the countries constructing and operating WWER-440 and WWER-1000 established the Council of regulatory bodies in 1987 for better efficiency of a multilateral co-operation.

The main fields of co-operation are as follows:
- improvement of regulatory procedures connected with siting, design, manufacturing, construction and operation of nuclear facilities,
- formulation and modifications of nuclear safety requirements,
- analysis of changes influencing nuclear safety,
- initiation and evaluation of research activities connected with safety,
- exchange of information on safety related events in nuclear power plants,
- quality of personnel of nuclear power plants and of regulatory bodies,
- quality assurance during construction and operation of nuclear power plants,
- unification of actions towards the IAEA.

The forms of co-operation are:
- regular meetings,
- establishing of permanent or temporary working groups,
- organization of topic seminars,
- exchange of inspectors and joint inspections.

At present the Council consists of the representatives of Bulgaria, CSFR, Cuba, Hungary, Poland, Russia and Ukraina as members and of Finland and Germany as observers.

3.12. Legislative arrangements should be put in place to require a comprehensive safety reassessment of each plant on a periodic basis.

This is understood to be the practice in many of the countries attending the Peer Group discussions.

Canada requires all its power reactor licensees to review and update the Safety Report for each facility at least once every three years, by means of a condition in the facility Operating Licence. This review must include all changes resulting from modifications to equipment and procedures. The licensees are further required to

incorporate in the Safety Report the results of the most recent safety analysis methods and computer codes.

In Belgium, the operating licence of each NPP states that "During the tenth, twentieth, thirtieth, etc..., year after initial startup, the licencee and the regulatory body perform a comparison between on the one hand the plant and its procedures, and on the other hand the rules, standards and practices currently applied in the United States and in the European Community. A common report highlights the differences found, the necessity and the possibility to remedy them, and, if need be, the improvements which will be implemented and the planning of the works.".

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