

Regulatory Aspects of NPP Safety

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Abstract

In beginning, a history of legislative process regulating industrial utilisation of nuclear energy is given, including detailed list of decrees issued by the first regulatory body supervising Czech nuclear installations – Czechoslovak Atomic Energy Commission (ČSKAE). Current status of nuclear regulations and radiation protection, especially in connection with Atomic Act (Act No 18/1997 Coll.), is described. The Atomic Act transfers into the Czech legal system a number of obligations following from the Vienna Convention on Civil Liability for Nuclear Damage and Joint Protocol relating to the Application of the Vienna and Paris Convention, to which the Czech Republic had acceded. Actual duties and competence of current nuclear regulatory body - State Office for Nuclear Safety (SÚJB) - are given in detail. Execution of the State supervision of peaceful utilisation of nuclear energy and ionising radiation is laid out in several articles of the Act, which comprises:

- control activities of the SÚJB
- remedial measures
- penalties

Material and human resources are sufficient for fulfilment of the basic functions for which SÚJB is authorised by the law. For 1998, the SÚJB allotted staff of 149, approximately 2/3 of that number are nuclear safety and radiation protection inspectors. The SÚJB budget for 1998 is approximately 180 million Czech crowns (roughly 6 million US dollars). Inspection activity of SÚJB is carried out in three different ways:

- routine inspections
- planned specialised inspections
- inspections as a response to a certain situation (ad – hoc inspections)

Approach to the licensing of major plant upgrades and backfittings are mainly illustrated on the Temelín NPP licensing. Regulatory position and practices concerning review activities are presented.

Nuclear Regulations.

Historical background

Legislative process regulating industrial utilisation of nuclear energy was launched by the amendment to the Law No. 50/1976 Coll., on Land Planning and Construction Regulations (the Construction Act) and its implementing regulations No. 83/1976 Coll., on Construction Documentation and No. 85/1996 Coll., on More Detailed Regulation of Area Management and Construction Regulations. The Construction Act of 1976 established for the first time that construction of a nuclear installation shall require the special approval of the Regulatory Body (ČSKAE at that time). Regulation No. 85/1976 Coll. defined the types and content of Safety Analyses Reports required by the ČSKAE as a basic information necessary for the issuance of its consents and Regulation No. 83/1976 Coll. established that three types of Safety Analysis Reports shall be an integral part of the documentation of constructions with nuclear installations:

- Siting (Initial) Safety Analysis Report - for site permit,
- Preliminary Safety Analysis Report - for construction permit,
- Pre-operational Safety Analysis Report - for operational permit.

Consequential to the regulations mentioned above, the following binding regulations were issued during 1978 - 1980:

Decree No. 2/1978 Coll. of the ČSKAE, on Nuclear Safety Assurance in the Process of Nuclear Power Installations Designing, Licensing and Construction, which defined technical requirements and safety criteria for nuclear power plants designs.

Decree No. 4/1979 Coll. of the ČSKAE, on General Criteria for Nuclear Safety Assurance in the Process of Nuclear Power Installations Siting which established condition and exclusion criteria for nuclear power plants siting,

Decree No. 5/1979 Coll. of the ČSKAE, on Nuclear Safety Assurance of Selected Items in Nuclear Power Installations from the Viewpoint of Nuclear Safety, which introduced quality assurance system for activities and components important to nuclear safety.

Decree No. 6/1979 Coll. of the ČSKAE, on Nuclear Safety Assurance in the Process Of Nuclear Power Installation Commissioning and Operation, which defined individual stages of the commissioning process and specified documentation and requirements necessary for the issuance of a license for the transition to next stage.

The Act No. 28/1984 Coll. on State Supervision of Nuclear Safety at Nuclear Installations issued in 1984 was the last in this first part of the legislative framework for nuclear safety assurance in the Czech Republic. This Act established the body which exercised the state supervision of nuclear safety, independent on manufacturers and operators of nuclear installations, - the former ČSKAE. Act No. 28/1984 Coll. established, for the first time the Czech Republic, that responsibility for nuclear safety of a nuclear installation bears its Constructor, or when in operation, Operator (Responsible Organisation).

Act No. 28/1984 Coll. and connected legislative documents at that time, were significant modern instruments for the nuclear safety control which, in the conditions of former Czechoslovakia, contributed to its new quality and level comparable with the world practice, especially with that recommended by the IAEA.

This legislative framework established basic requirements imposed for the purpose of nuclear safety and rules for exercising the state supervision, defined its authority, as for example approval of Limits and Conditions of safe operation, of start-up programs, of quality assurance programs, as well as the authority to verify professional competence of selected personnel at nuclear installations. It also defined the enforcement instruments - penalties for breaking the law or for endangering nuclear safety, as well as the authority to order that the power of a nuclear installation shall be reduced, or that it shall be shut down if there is danger in case of delay.

This legislative framework was in 1984 - 1990 supplemented by a number of other regulations:

Decree of the ČSKAE No. 9/1985 Coll., on Nuclear Safety Assurance for Nuclear Research Installations, which established technical and organisational requirements for nuclear safety assurance of research reactors,

Regulation of the ČSKAE No. 67/1987 Coll., on Nuclear Safety Assurance in Radioactive Waste Management which defined requirements for systems and activities related to processing and storage of radioactive waste generated by nuclear installations,

Regulation of the ČSKAE No. 100/1989 Coll., on Physical Protection of Nuclear Installations and of Nuclear Materials which into the legislative framework introduced requirements following from the Convention on Physical protection of Nuclear Installations and Nuclear Materials,

Regulation of the ČSKAE No. 191/1989 Coll., which Establishes Methods, Terms and Conditions for Verification of Special Professional Competence of Selected Personnel at Nuclear Installations (Control Room Operators),

Regulation of the ČSKAE No. 436/1990 Coll., on Quality Assurance of Selected Installations with Regard to Nuclear Safety of Nuclear Installations which amended the ČSKAE Regulation No. 5/1980 Coll.

Current status

In January 1997 the Parliament of the Czech Republic passed new act under No. 18/1997 Coll., on Peaceful Utilisation of Nuclear Energy and Ionising Radiation (the Atomic Act) and on Amendments and Additions to Related Acts. The Act entrusted execution of the state administration and state supervision in peaceful utilisation of nuclear energy and ionising radiation, to the SÚJB, and newly established the province of its authority. The Act was developed with the objective to re-codify utilisation of nuclear energy and ionising radiation, and, especially to modify so far insufficiently regulated issues such as radioactive waste management, liability for nuclear damage, emergency preparedness.

The Atomic Act now regulates:

- methods of both nuclear energy and ionising radiation utilisation together with conditions for performance of activities related to nuclear energy utilisation and practices resulting in radiation exposure,
- methods of both nuclear energy and ionising radiation utilisation together with conditions system of protection of human beings and the environment from undesirable effects of ionising radiation,
- obligations within the process of preparation and implementation of measures leading to reduction of both natural and radiation incident exposure
- special requirements ensuring civil liability in case of a nuclear damage

- conditions for ensuring safe disposal of radioactive wastes
- performance of the state administration and supervision within the process of nuclear energy utilisation, during practices resulting in radiation exposure and over nuclear items.

In such a way the Atomic Act defines conditions for peaceful utilisation of nuclear energy and ionising radiation, including activities which shall require the SÚJB license or authorisation. An extensive list of licensee obligations sets forth, besides other, obligations related to the preparedness for a radiation accident.

In the area of radioactive waste management, under the terms of the Act, the State guarantees safe disposal of all radioactive waste, and a Radioactive Waste Repositories Authority had to be set up for this purpose by the Ministry of Industry and Trade. Activities of the Authority are financed from so called nuclear account with main income represented by payments from radioactive waste generators.

The Atomic Act transfers into the Czech legal system a number of obligations following from the Vienna Convention on Civil Liability for Nuclear Damage and Joint Protocol relating to the Application of the Vienna and Paris Conventions, to which the Czech Republic had acceded. Thus, a gap, which prevented participation of foreign enterprising subjects in the activities within the Czech nuclear program, had been effectively closed.

The Atomic Act should be considered a very significant dividing line in the development of the Czech legislation. It declared invalid and replaced hitherto valid legislation and at the same time authorised the SÚJB, and in some specific cases - also other State Administration Bodies, to issue a set of consequential implementing regulations. These are:

Regulation of the SÚJB No. 142/1997 Coll., on Type-Approval of Packaging Assemblies for Transport, Storage, and Disposal of Radionuclide Sources and Nuclear Materials, on Type-Approval of Ionising Radiation Sources, and on Type-Approval of Protective Devices for Work Involving Ionising Radiation Sources and other Devices for Ionising Radiation Source Handling (on Type-Approval),

Regulation of the SÚJB No. 143/1997 Coll., on Transportation and Shipment of Specified Nuclear Materials and Specified Radionuclide Sources,

Regulation of the SÚJB No. 144/1997 Coll., on Physical Protection of Nuclear Materials and Nuclear Facilities and their Classification,

Regulation of the SÚJB No. 145/1997 Coll., on Accounting for and Control of Nuclear Materials and their Detailed Specification,

Regulation of the SÚJB No. 146/1997 Coll., Specifying Activities Directly Affecting Nuclear Safety and Activities Especially Important from Radiation Protection Viewpoint, Requirements on Qualification and Professional Training, on Method to be Used for Verification of Special Professional Competency and for Issue Authorisations to Selected Personnel, and the Form of Documentation to be Approved for Licensing of Expert Training of Selected Personnel,

Regulation of the SÚJB No. 147/1997 Coll., Laying Down a List of Selected Items and Dual Use Items in Nuclear Sector,

Regulation of the SÚJB No. 184/1997 Coll., on Radiation Protection Requirements,

Regulation of the SÚJB No. 214/1997 Coll., on Quality Assurance in Activities Related to the Utilisation of Nuclear Energy and in Radiation Activities, and Laying Down Criteria for the Assignment and Categorisation of Classified Equipment into Safety Classes,

Regulation of the SÚJB No. 215/1997 Coll., on Criteria for Siting Nuclear Facilities and Very Significant Ionising Radiation Sources,

Regulation of the SÚJB No. 219/1997 Coll., on Details of Emergency Preparedness of Nuclear Facilities and Workplaces with Ionising Radiation Sources, and on Requirements on the Content of On-Site Emergency Plans and Emergency Rules,
Regulation of the SÚJB No. 106/1998 Coll., on Nuclear Safety and Radiation Protection Assurance during Commissioning and Operation of Nuclear Facilities.

The following regulations are being prepared:

- Regulation on Nuclear Safety Assurance in the Process of Nuclear Installations Designing, Licensing and Construction,
- Regulation on Nuclear Safety and Radiation Protection Assurance in the Process of Decommissioning of Nuclear Installations and Workplaces with Ionising Radiation Sources,
- Regulation on the National Monitoring Network Organisation,
- Regulation on Elaboration of District Emergency Plan and Off-Site Emergency Plan,
- Regulation on Liability for Nuclear Damage,
- Government Order on Emergency Planning Area,
- Government Order on Payments to Nuclear Account.

Duties of the SÚJB

Since June 1997, the SÚJB competence and duties have been established by the new act No. 18/1997 Coll., on Peaceful Utilisation of Nuclear Energy and Ionising Radiation (the Atomic Act).

Competence According to its Article 3 is:

State administration and supervision of the utilisation of nuclear energy and ionising radiation and in the field of radiation protection shall be performed by the State Office for Nuclear Safety

The Office

- a) shall carry out State supervision of nuclear safety, nuclear items, physical protection, radiation protection and emergency preparedness on the premises of nuclear installations or workplaces with an ionising radiation source and shall inspect the adherence to the fulfilment of the obligations arising out of this Act;
- b) shall issue licences to perform practices governed by this Act and shall issue type-approvals for packaging assemblies for transport and storage of nuclear materials and radionuclide sources given in an implementing regulation, for ionising radiation sources and for other products;
- c) shall issue authorisations for activities performed by selected personnel;
- d) shall approve documentation, programmes, lists, limits, conditions, methods of physical protection assurance, emergency rules and, subject to discussion with the relevant District Authority of compatibility with off-site emergency plans, on-site emergency plans and their modifications;
- e) shall establish conditions, requirements, limits, constraints and values for exemption from the effect of this Act;
- f) shall establish emergency planning zones and shall define areas of a workplace with an ionising radiation source where specific preventive and safety

measures for handling of ionising radiation sources are required (hereafter referred to as the "controlled area");

- g) in accordance with an implementing regulation, shall establish requirements to ensure emergency preparedness of licensees, and shall inspect their fulfilment;
- h) shall monitor and assess the exposure status and regulate exposure of people;
- i) shall provide information to municipalities and District Authorities concerning radioactive waste management within their territory of administration;
- j) shall co-ordinate the activity of the National Radiation Monitoring Network, the functions and organisation of which shall be set out in an implementing regulation, shall provide for the functioning of its head-office, and shall provide for the activities of an Emergency Response Centre and for an international exchange of information on the radiation situation;
- k) shall establish State and Professional examination commissions for verification of special professional competence of selected personnel, and shall issue statutes for these commissions and specify activities directly affecting nuclear safety and activities especially important from the radiation protection viewpoint;
- l) shall maintain a State system of accounting for and control of nuclear materials and establish requirements for accounting for and methods for control of nuclear material;
- m) shall maintain a national system for registration of licensees, registrants, imported and exported selected items, ionising radiation sources, and a record exposure of the public and exposure of persons coming into contact with ionising radiation sources at their work (hereinafter referred to as "exposed workers");
- n) shall ensure, by means of the National Radiation Monitoring Network and based on assessment of the radiation situation, the availability of background information necessary to take decisions aimed at reducing or averting exposure in the case of a radiation emergency;
- o) shall approve a classification of nuclear installations or their components and nuclear materials into appropriate categories, from the physical protection aspect;
- p) shall ensure international co-operation within its sphere of competence and, in particular, shall be a intermediary of technical co-operation with the International Atomic Energy Agency;
- q) shall take decisions ensuring management of nuclear items or radioactive waste if their owner or generator proceeds in contravention to this Act and fails to remedy conditions that have arisen;
- r) shall be obliged to provide the public with adequate information concerning the results of its activities, unless they are subject to State, professional or commercial secrecy, and once a year to publish a report on its activities and submit it to the Government of the Czech Republic and to the public.

Rights and responsibilities of the Regulatory Body

Execution of the State supervision of peaceful utilisation of nuclear energy and ionising radiation is laid out in Section 6 of the Atomic Act, which comprises:

- **inspection activities of the SÚJB (Article 39),**
- **remedial measures (Article 40),**
- **penalties (Articles 41 and 42).**

Thus, the Atomic Act, together with Act No. 552/1991 Coll., on State Inspection and Monitoring, in wording of Act No. 166/1993 Coll., provides sufficient instruments to enforce the legislative requirements for nuclear safety and radiation protection and allows to fulfil all duties of SÚJB in accordance with Atomic Act.

These instruments are:

- enter at any time facilities, installations, operation areas, territories and other workplaces of inspected persons where activities related to nuclear energy utilisation or practices resulting in exposure are being carried out,
- check the compliance with requirements and conditions of nuclear safety, radiation protection, physical protection and emergency preparedness and inspect the nuclear installation conditions, adherence to the Limits and Conditions and operational procedures,
- demand evidence of fulfilment of all obligations for assurance of nuclear safety, radiation protection, physical protection and emergency preparedness of a nuclear installation and to take measurements and samples at the premises of inspected persons such as are necessary for checking the compliance with this Act and other regulations issues on its basis,
- verify professional competence and special professional competence under this Act,
- participate in investigations and clean up of events important for nuclear safety, radiation protection, physical protection and emergency preparedness, including unauthorised handling of nuclear items or ionising radiation sources.

Should inspector identify deficiencies in the practice of an inspected person, he is authorised, depending on the nature of the identified shortcoming, to:

- require the inspected person to remedy the situation within the a set time period,
- bind the inspected person to perform technical inspections, reviews or tests of function condition of the installation, its parts, systems or its assemblies, provided it is necessary for verification of nuclear safety,
- withdraw the special professional competence authorisation issued to an employee of the inspected person, in the event of serious violation of his obligations or his not meeting requirements of professional competence, and physical or mental capability,
- propose that a penalty be imposed (in compliance with rules specified in Article 42 of Atomic Act).

The SÚJB is authorised in case, if there is danger of a delay or a occurrence of undesirable situations with an impact on nuclear safety, radiation protection, physical protection and emergency preparedness, to issue a provisional measure imposing on the

inspected person the obligation to reduce the power output or suspend operation of the nuclear installation, suspend assembling of components or systems of a nuclear installation, to prohibit the handling of nuclear items, ionising radiation sources or radioactive waste, or to impose on the inspected person the obligation to suffer that that handling is performed by another person, by the expense of the inspected person.

Material and human resources of the SÚJB

For 1998, the SÚJB was allotted staff of 149, approximately 2/3 of that number are nuclear safety and radiation protection inspectors. The SÚJB budget for 1998 was approximately 180 million Czech Crowns (roughly 6 million US dollars). In the present Czech Republic conditions, the material and human resources are sufficient for fulfilment of the basic functions for which the SÚJB is authorised by law.

The SÚJB at the same time acts as a managing authority of the National Radiation Protection Institute (SÚRO) which provides the technical support in the area of radiation protection.

Responsibilities within the SÚJB organisational structure are established by the Organisational Statute and other internal documents.

In the beginning of 1998, the SÚJB Chairman assigned two separate Advisory groups of independent experts - for nuclear safety and radiation protection. Activity of these groups is not regulated by law; however, they will undoubtedly become a significant advisory body for important issues of nuclear safety and radiation protection for which the SÚJB has to work out adequate solutions.

Inspections

The inspections are one of the main tools of verification and assessment nuclear safety in accordance with the Atomic Act.

Inspection activity of the State office for nuclear Safety (SÚJB) is carried out as three different types:

- routine inspections
- planned specialised inspections
- inspections as a response to a certain situation (ad-hoc inspection)

Routine inspections cover all regular activities of the licensee especially with respect to the observance of Limits and Conditions. These inspections are planned so as they would followed the internal instruction of SÚJB No. VDS13/94 describing activities of site inspectors in Dukovany NPP and the internal instruction called "Program of routine inspections in the NPP". Routine inspections are fulfilled as a regular daily observation of ongoing facility work by site inspectors. The activity itself is documented in monthly protocol.

Planned specialised inspections are carried out in accordance with SÚJB inspection plan that is prepared regularly for 6-month period. This inspection programme is based on:

- evaluation results of the inspections performed during previous period
- operational schedule of Dukovany NPP
- construction plan for Temelin NPP
- results and findings of the independent safety analyses
- conclusions of the SÚJB evaluating effort (for example evaluation ten year period of operation NPP EDU)

and it is prepared in accordance with the internal instruction of SÚJB No. VDS15/96. These planned inspections are usually carried out by a team, composed of inspectors from the Headquarters in Prague together with site inspector of corresponding NPP.

Ad-hoc inspections are performed to examine events and failures having impact on nuclear safety, as well as to clarify serious findings of the routine or planned inspections. Ad-hoc inspections are carried out by site inspectors or by inspectors from the Headquarters in Prague as needed.

Outputs of the inspection are:

- **Protocol of the inspection**
- **Inspection Report**

Protocol

Every inspection has to be closed with protocol - an official document in accordance with Act No.552/1991Sb. Par 15 working out by inspector and signed by both sides: representatives of inspected organisation (NPP) and attending inspectors by 5 days after finishing inspection. The protocol describes inspection in details (subject, programme, findings, require relevant remedies) and reflects results of observation.

Inspection Report is an internal document of SÚJB. Its purpose is to support protocol in sense of additional comments and explanations to the findings and conclusions obtained as results of inspections and written down in protocol. Second role of the Inspection report is to give inspector opportunity to suggest improvement and changes in Inspection plan, internal documentation and so on. Finally Inspection report should help to other inspectors and their superior whose don't take part in inspection to exactly understand the situation.

Procedure applied for the numbering, archiving and circulation of the Protocols and Inspection Reports is laid down in the Internal instruction of SÚJB VDS 008/ 97.

Inspection activities are evaluated systematically and regularly. Methodology of assessment inspection is based on U.S. Nuclear Regulatory Commission Methodology Systematic assessment of licensee Performance (SALP) that was adjusted to particular condition in our country (Temelín NPP under construction) There are two ways of evaluation inspection activities:

- **Inspection Evaluation Board**
- **Evaluation Inspection Report**

Inspection Evaluation Board

Every inspection is subject of discussion during regular session of Inspection Evaluation Board. Inspection Evaluation Board is working group of SÚJB managers and specialist established to review and assess inspection activities. This Board meets one per month to

assess inspections that were performed in previous period. During discussion Inspection Evaluation Board also determines:

1. Following steps in the case more complicate situations or incidents
2. Classification particular inspection into Functional Areas as they have been specified in Internal instruction VDS 015/96
3. Category Rating for each inspection as they have been specified in Internal instruction VDS 015/96 (The proposal of Category Rating is given by inspector performing particular inspection)
4. Changes in the current Inspection plan

Evaluation Inspection Report

The deputy chairman for nuclear safety submits twice a year Evaluation Inspection Report based on the results Sessions of Inspection Evaluation Board to the management of SÚJB to discussion and following consent. This Evaluation Inspection Report contains statistical data concerning basic facts about realised inspections, assessment of licensee activities in particular functional areas including final rating for each functional area and suggestion for improvement of inspection activity in future.

Enforcement

Legal basis for enforcement is given in Act No.18/ 1997 Coll. Atomic Act Par 40-41 where is said:

In case an inspector identifies discrepancies at inspected persons, he or she is authorised, adequately to the finding, to

- ❖ require the inspected person to correct the situation, within a determined time period,
- ❖ order the inspected person to perform technical inspections, revisions or testing of operation capability of the equipment, its parts, system or assemblies, if necessary to verify the nuclear safety status,
- ❖ withdraw the licence of special professional competence of an employee of the inspected person, in case of a serious violence of his or her responsibilities or not fulfilling requirements of professional competence and physical or mental fitness,
- ❖ propose a penalty.

The Office is authorised, in case of an anticipated delay or an occurrence of undesirable situation, important from the viewpoint of nuclear safety, radiation protection, physical protection and emergency preparedness, to impose a provisional measure requiring the inspected person to reduce output or suspend operation of nuclear installation, suspend erection of components or systems of nuclear installation, prohibit manipulation with nuclear items, ionising radiation sources or radioactive wastes, or allow that other person manipulate with them, at costs of the inspected person.

For a violence of a legal obligation determined in this Act, the Office imposes a penalty, up to the amount of

- CZK 100 million to those who violate the prohibition of nuclear energy utilisation for other than peaceful purposes, according to § 4 or prohibition according to § 5, paragraph 1,
- CZK 50 million to a person performing activities according to § 9, paragraph 1, without a licence,
- CZK 10 million to a licensee for breach of obligation according to §§ 17 through 20,
- CZK 10 million to a licensee, violating the prohibition of an import of radioactive wastes to be disposed according to § 5 par. , and not fulfilling the obligation of providing levies

to the nuclear account, according to § 27, or the obligation of disposing radioactive wastes using an authorised person, according to § 26, and § 48 paragraph 1,

- CZK 200 thousands to employees of an inspected person, or to natural persons who are members its bodies, for a distortion or hiding facts important for the inspection performance or not co-operating within the process of the inspection,
- CZK 100 thousand for not fulfilling obligations and requirements determined by this Act.

The penalty according to § 41 of Atomic Act may be imposed within 3 years since the date the Office identified a violence of the obligation, however, the latest within 10 years since the violation occurrence.

Licensing of major plant upgrades and backfittings

The General Safety Analysis Reports (GSAR) for the original Soviet design of the Czech NPPs were evaluated by the Czechoslovak Atomic Energy Commission in the 70-ties and 80-ties. Evaluation of the Preliminary Safety Analysis Report (PSAR) was conducted. It resulted in the Commission decision on its consent with the construction permit issuance.

As an example I would like to describe licensing of Temelín NPP, which includes licensing of both upgrades and backfittings.

In the early 90-ties a decision was taken to modify the original NPP Temelín design. In view of these changes that would definitely have significant impact on the results of the original plant design licensing assessment, Regulatory Body took a position that Amendment to the original PSAR shall be generated and submitted to SÚJB for evaluation. It was further agreed that the Amendment should follow the format and contents of PSAR as specified in the US NRC Regulatory Guide 1.70. Following this, the Regulatory Body decided to evaluate this Amendment through a process based on the guidance provided in the US NRC Standard Review Plan (NUREG-0800). A formal licensing procedure was drafted and implemented for NPP Temelín regulatory licensing assessment.

As a result of this, NPP Temelín licensing team has been established by the Regulatory Body chairman appointment. It is composed of the Regulatory Body professional staff members and it is headed by a project manager. There is a leading person on this team with primary responsibility for licensing assessment to be performed in each individual technical area. This team is supported by experts from the Nuclear Research Institute in Řež and other independent organisations and individuals. US AID funded and US NRC managed assistance program “US Licensing Technology Transfer to the Czech Republic” which has been launched to provide training of the team members and the outside experts in licensing assessment of the above-specified parts of the PSAR.

Since the very beginning of the NPP Temelín design modification project, regular and effective communication has been established between SÚJB and licensee. As an example, for the two major modification efforts (plant I&C systems and fuel and subsequently core design change) and new safety analysis (PSAR chapter 15), they have the following forms:

- Regulator is kept informed on the design intentions as well as on results of the progress made in the design of individual modifications. This is usually accomplished through presentations given by supplier Westinghouse Electric Company (WELCO) design and analysis staff to the licensing team and experts from the supporting organisations followed by informal discussions on technical and regulatory aspects of the presented information,
- A series of the so-called “Topical Report” generated by supplier has been submitted to the Regulator for consideration and evaluation. In case of I&C these reports address some

safety related issues of more general nature (such as I&C equipment qualification methodology, reliability analysis of I&C systems, implementation of diversity and defence-in-depth within the I&C area, compliance with some design criteria, software verification and validation methodology, etc. or provide more detailed information on the design of individual I&C systems such as the primary reactor protection system, diverse protection system, reactor control and limitation system, etc.). Topical Reports are not official licensing submittals as per the Czech Republic regulatory legislation and practice. They include information which is considered by the designer/supplier as proprietary, therefore, they are not public documents,

- Sequential revisions of relevant chapters or sections of the PSAR are submitted to SÚJB for review and evaluation prior to the submission of the final version of the PSAR Amendment,
- Requests for Additional Information (RAI's) are communicated to the designer/supplier via the licensee. Evaluation of above-mentioned documentation usually results in findings and raising formal, i.e. in writing, questions – RAI's. Formal responses to the RAI's are assessed for adequacy and completeness and provide a basis for completion of evaluation finding. This process is usually repeated in several cycles.

As a pilot project, the licensing assessment of the Amendment to the NPP Temelín PSAR Chapter 4 (Reactor), Chapter 7 (I&C systems) and Chapter 15 (Safety analyses) is being performed. Database ISSUES (an MS ACCESS 97 application) of technical requirements was created as an auxiliary tool for the licensing process. This so called “licensing database” has been developed by the Regulatory Body staff within the already mentioned assistance program “US Licensing Technology Transfer to the Czech Republic” to serve the following purposes:

- to specify and record all licensing issues which will have to be addressed in the licensing review of the fuel, I&C and accident analyses related safety documentation submitted to the Regulatory Body,
- to record evaluation of individual licensing issues and generated RAI's,
- to keep track of the licensee's response to individual RAI's, i.e. to record the response as well as its evaluation and new RAI's, if any,
- to provide an efficient and flexible tool for managing the licensing process, e.g.
 - to get quickly a precise picture of the actual status of the process in terms of how many issues have been evaluated, how many of them remain “open” and how many have been “closed”, how many RAI's have been raised and to what topics, etc.,
 - to use the database information in decision making with respect to licensing project resources allocation, focusing attention on bottlenecks, planning future activities, etc.

Regulatory position and practices concerning review activities.

The licensing process for first Temelín unit is under way. A special situation developed as for the completion of the Temelín NPP technical equipment from different countries (e.g. Westinghouse Electric Company was contracted to supply the reactor fuel,

instrumentation and control), designed and manufactured at different times, have to be integrated.

It is obvious that Czech codes and standards must be unconditionally met. Another obligatory condition was not to disturb other parts of the design (design's compatibility and design's reliability).

Safety assurance for safety-related items (e.g. fuel system) has to be demonstrated by submitting complete documentation (as a Supplement to the Safety Report and Topical Reports) from the point of view of the design's compatibility with other components and parts taking into account existing (original) materials, moderator (water chemistry), especially from the standpoint of:

- thermal hydraulic properties - vibration, hydraulic resistance, CHF correlation, fuel rod bowing, effect of spacing grids, pressure losses,
- mechanic properties - rigidity, cyclic fatigue, wear, cladding abrasion, deformation by external forces (load during LOCA and seismic events), kinetics of control assemblies drop,
- chemical properties - corrosion, hydriding,
- neutronic-physical properties - peaking factors, influence of different enrichment, water-uranium ratio, etc.; shutdown reactivity margin; stability; maximum speed of the reactivity insertion, both calculated and experimental (especially for non-active tests area).

Design's reliability and safety related influence has to be demonstrated by proving that:

- fuel design parameters will not be exceeded,
- fuel cooling will be ensured,
- coolability is always maintained
- core design neutronic parameters will be met for normal and abnormal operation and accident conditions (as defined in the Decree No 2/1976 Coll. and/or in 10CF50 App.A, or in equally binding Guidelines of the manufacturer's country).

In addition to this State Regulatory Body (State Office for Nuclear Safety) requested the deliverables to be licensable in the country of origin i.e. to meet the national codes and standards.

As the possibility to adopt any set of criteria or limits which would assure fulfilment of general requirements to protect public health and safety and general design requirements is opened by Czech legislative, the key decision to use US NRC Licensing Review Process for the SAR parts concerning fuel, I&C and accident analysis was taken.

SÚJB as a Regulatory Body is engaged on further activities supporting the correctness of the review of safety documentation. Important one is focused on calculational program's qualification. The verification of the adequacy of the code used to perform calculation to assess properties of the plant is the main goal. Groups of the experts in the given field are formed. They are nominated by the Chairman of SÚJB. No fill-in is permitted, they are supposed to express their opinion as independent experts and not acting as representative of maternal organisation. There is a possibility to invite another experts (without right to vote). According to the field of expertise 7 group have been formed:

1. Core characteristics calculation
2. Fuel rod /fuel assembly behaviour
3. Thermo-hydraulic analysis of transients
4. Beyond DBA
5. Stress and strain component analysis
6. Radionuclid transport and Source term calculation
7. Reliability analysis and probabilistic safety assessment (PSA)

Based on documentation required for the Code Qualification Procedure, on the chosen opponent's review of the code under question and on the opinion of the expert group members the suitability of the code for solving the analysis is being assessed. Experiences gained during the Temelín licensing process were applied also for licensing process of the new fuel for Dukovany plant.

A new revision of Safety Analysis Report is under review process now as substantial parts (fuel system design, nuclear design, thermal and hydraulic design, accident analysis) reflect introduction of the new (advanced) Russian fuel.

The first complete reassessment of nuclear safety (innovated Safety Analysis Report) for the Dukovany units was performed after 10 years of operation using advanced state-of-the-art tools and taking into account operational experience and plant modifications. It was prepared by the utility to fulfil one of the condition of the State Regulatory Body from its decision No. 154 (1991), which established conditions for the 1st unit license for continued operation after 10 years. On the basis of this innovated Operational Safety Analysis Report, the State Regulatory Body by its decision No. 197 (in August 1995) has issued 2 year license for the continued operation of Dukovany 1st unit subject to fulfilment of 97 requirements. One of the conditions requires continually updating ("Living") Operational Safety Analysis Report

"Living" (periodically updated) Operational Safety Report is now in effect. It documents the status of nuclear safety assurance of the NPP Dukovany units. This report consists of constant unchangeable part (the same for all 4 NPP Dukovany units) as well as of the parts which are updated regularly once a year, always not later than by the end of the next half-year - at the same time for all units. This safety report is based on the complemented "Operational Safety Report for Nuclear Power Plant Dukovany 1st Unit".

Conclusions

Presented paper gave the comprehensive and simultaneously brief overview on all the aspects of Czech supervision of nuclear safety of nuclear installations. The supervision of nuclear safety is carried out in a manner covering and fulfilling all requirements of the Czech nuclear legislation and in compliance with international agreements as Nuclear Safety Convention, NPT and using recommendations of the IAEA and OECD/NEA. The inspections are one of the main tools of verification and assessment nuclear safety in accordance with the new act No. 18/1997 Coll., on Peaceful Utilisation of Nuclear Energy and Ionising Radiation (the Atomic Act). Execution of the State supervision of peaceful utilisation of nuclear energy and ionising radiation includes also remedial measures and penalties.

The Atomic Act defines conditions for peaceful utilisation of nuclear energy and ionizing radiation, including activities, which shall require the SÚJB license or authorization. It sets forth, besides other, obligations related to the preparedness for a radiation accident.

Legislative framework provides sufficient instruments to enforce the legislative requirements for nuclear safety and radiation protection and allows to fulfil all duties of SÚJB in accordance with Atomic Act.

The Atomic Act transfers into the Czech legal system a number of obligations following from the Vienna Convention on Civil Liability for Nuclear Damage and Joint

Protocol relating to the Application of the Vienna and Paris Conventions, to which the Czech Republic had acceded.

The practices of the licensing process are considered to be on a high level, the review is very thorough and is well documented. The use of database of safety issues, requirements, request for additional informations and licensee responses is very progressive way of filling system and keeping traceback.

We consider material and human resources as sufficient for fulfillment of the basic functions for which SÚJB is authorised by the law.

We believe the supervision of nuclear safety of nuclear installations of the Regulatory Body in the Czech Republic is performed on level fully comparable with international experiences and rules.