The Czech Republic National Report

under the

Convention on Nuclear Safety

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Introduction

This Report is the first National Report of the Czech Republic prepared, pursuant to its Article 5, for the purposes of review meeting of the parties to the Convention on Nuclear Safety. This Report was elaborated with the objective to describe how the Czech Republic has been in the first half-year of 1998 fulfilling obligations arising from the Convention. The structure of the Report is based on the recommendations approved at the preparatory meeting of parties to the Convention in September 1995 and published as "Guidelines Regarding National Reports under the Convention on Nuclear Safety".

At present, the Czech Republic has two nuclear power plants covered by the Convention on Nuclear Safety, both owned by Czech power utility - ČEZ, a.s. First, nuclear power plant Dukovany with four reactor units of VVER-440/213 type, is in operation. These units were commissioned as follows:

- 1st unit - 1985,
- 2nd unit - 1986,
- 3rd unit - 1987,
- 4th unit - 1987.

Second, nuclear power plant Temelín with two reactor units of VVER-1000/320 type, is under construction since 1986.

The National Report, while reporting on the state of implementation of individual Articles of the Convention, considers only those two nuclear installation. Nevertheless, the basic philosophy and principles of nuclear safety assurance applied to these two nuclear power plants, are reasonably valid also for other nuclear installations in the Czech Republic - three research reactors, Interim Spent Fuel Storage Facility and Radioactive Waste Repository. The last two nuclear installations will be, with regard to their nature, subject of evaluation within the separate Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.

List of Abbreviations

ČSSR	Czechoslovak Socialist Republic
ČSFR	Czech and Slovak Federative Republic
ČEZ, a.s.	Czech Power Utility, Plc
ČEZ-EDU	Czech Power Utility – nuclear power plant Dukovany
ČEZ-ETE	Czech Power Utility - nuclear power plant Temelín
VI ČEZ	Production Inspection of ČEZ, a.s.,
SÚJB	State office for Nuclear Safety
ČÚBP	Czech Authority for Worker Safety
ČHMÚ	Czech Institute for Hydrometeorology
EGP	Energopojekt Prague (NPP designer organization)
ITI	Institute for Technical Inspection
OkÚ	District Authority
RÚ CO	Regional Civil Defence Authority
MAAE	International Atomic Energy Agency – IAEA
VKRH	Governmental Commission for Radiation Emergencies
ÚJV Řež	Nuclear Research Institute Řež - NRI Řež
ČSKAE	Czechoslovak Atomic Energy Commission
VÚJE	Research Institute for Nuclear Reactors (Slovakia)
WANO	World Association of Nuclear Operators
INSAG	International Nuclear Safety Advisory Group
ISO	International Standard Organisation
ANSI	American Nuclear Standard Institute
ANS	American Nuclear Society
INPO	International Nuclear Power Operators Organisation
OSART	Operational Safety Review Team
ASSET	Assessment of Safety Significant Events Team
PSA	Probabilistic Safety Assessment
IPERS	International Peer Team Service
PHARE	European Union Technical Assistance Programme
NUSS	IAEA Nuclear Safety Standards
WDPF	Westinghouse Distributed Processing Family
BOZP	Safety and protection of heath during work
KP	Controlled area
HP	Emergency Preparedness
PO	Fire Protection
SAS	Safety Advisory System
ZHP	Emergency Planning Zone
INES	International Nuclear Event Scale
NATO	North-Atlantic Treaty Organisation
MSK-64	Medvedev Sponheuer Karnik (Seismic Intensity Scale)

Article by Article Review

1. Existing nuclear installations - Article 6 of the Convention

Each contracting party shall take the appropriate steps to ensure that the safety of nuclear installations existing at the time the Convention enters into force for that Contracting Party is reviewed as soon as possible. When necessary in the context of this Convention, the Contracting Party shall ensure that all reasonably practicable improvements are made as a matter of urgency to upgrade the safety of the nuclear installation. If such upgrading cannot be achieved, plans should be implemented to shut down the nuclear installation as soon as practically possible. The timing of the shut-down may take into account the whole energy context and possible alternatives as well as the social, environmental and economic impact.

1.1 Description of the current situation

1.1.1 Nuclear installations in the Czech Republic as defined in Article 2 of the Convention

At present, in the Czech Republic there are in operation four VVER-440/213 reactor units of nuclear power plant Dukovany. Two VVER-1000/320 units are under construction at the Temelín site. Geographic location of both Czech nuclear power plants is shown in Fig. 1-1. For technical details of both plants see Appendix 1 to this National Report.

1.1.2 Nuclear power plant Dukovany

1.1.2.1 Overview of safety assessments performed, and the major results of those assessments

Evaluation of the nuclear safety assurance level at nuclear power plant Dukovany goes on practically from the very beginning of its construction in 1976. First analyses after the units were put into operation, and especially analyses performed as a reaction on the Chernobyl accident, resulted in the project of so called “Back-fitting of Nuclear Power Plant Dukovany”.


Czech Republic
Elbe R.
GERMANY
Liberec
Ústí nad Labem
POLAND
Trutnov
Litoměřice
Teplice
Mladá Boleslav
Oder R.
Karlovy Vary
Mělník
Louny
Hradec Králové
Elbe R.
Sokolov
Cheb
Prague
50° N
Rakovník
Pardubice
Krnov
Beroun
Kutná Hora
Šumperk
Opava
Orlová
Karviná
Ostrava
Havířov
Plzeň
BOHEMIA
Benešov
Žďár nad Sázavou
MORAVIA
Třinec
Vltava R.
Havlíčkův Brod
Olomouc
Frýdek-Místek
N
Prostějov
Klatovy
Přerov
Tábor
Jihlava
Morava R.
Zlín
Písek
Kroměříž
Strakonice
Brno
Otrokovice
ETE
Třebíč
Jindřichův Hradec
České Budějovice
EDU
Uherské Hradiště
Hodonín
SLOVAKIA
Znojmo
Český Krumlov
Břeclav
AUSTRIA
0 40 Miles
0 40 Kilometers
Danube R.
14° E
16° E
18° E

Since the beginning of the nineties, a significant attention was paid to repeated safety evaluation of VVER-440/213 units. Nuclear power plant Dukovany was subject of a whole set of analyses and supporting programmes, performed on the one hand by Czech specialists and on the other hand within international activities. This includes:

- evaluation of the results of IAEA missions,
- exchange of operational information within WANO,
- common activities of VVER-440/213 Operators,
- supporting analyses within the framework of international programmes of Technical Co-operation
- evaluation of nuclear power plant Dukovany safety after 10 years of operation,
- probabilistic safety assessment (PSA level-1 Study),
- technical audits (internal, external).

The following sub-chapters briefly describe the objectives, scope and main results of the individual evaluations. Their results were implemented as immediate, respective medium-term measures, or in the long-term, were used as a basic information for the preparation of so called ”Modernisation Programme of Nuclear Power Plant Dukovany”.

The IAEA missions

The Government of the Czech Republic, upon requests from the Operator, asked the IAEA for a number of missions with the objective to assess the overall level of nuclear safety assurance at nuclear power plant Dukovany (OSART, ASSET missions) as well as some specific technical or analytical issues related to nuclear safety (mission IPRES, evaluation of safety issues).

The first OSART mission at nuclear power plant Dukovany took place in September 1989. In November 1991 a follow up mission, so called ”Re-OSART, took place with the objective to complement the plant evaluation in the areas of management and maintenance. This mission had also another objective - to assess how the measures taken as a response to the recommendations of the previous mission had been implemented. Both missions stated that nuclear power plant Dukovany belonged among nuclear power plants with a very good level of nuclear safety assurance, and that was operated and managed professionally, by competent and trained personnel [1-1] [1-2]. That main conclusion of the missions was accompanied by a set of recommendations and proposals for further enhancement of the level of nuclear safety. In response to these recommendations, the plant management decided on the set of measures which have been implemented over the years.

ASSET mission to nuclear power plant Dukovany was organised in October 1993, with the objective to check on the occurrences prevention system, by reviewing implementation of so called ”operational feedback” system. The IAEA experts looked into how operational occurrences were investigated, how and what corrective measures were taken and how their efficiency was evaluated. The mission went into all significant operational occurrences over the last five years period, and assessed the NPP Dukovany approach to the safety improvement as a positive [1-3]. In 1996 followed the second ASSET mission which evaluated the operational occurrences prevention system, this time on the basis of a new approach based on so called ”self-assessment". The mission again assessed the level of plant safety as a very high [1-4].

The 1996 mission evaluating safety upgrading at Dukovany units was the following significant IAEA activity for the benefit of this nuclear power plant. It was organised within the framework of the IAEA Regional Technical Co-operation Programme. The mission evaluated technical measures applied at Dukovany units related to the safety issues identified by the IAEA as generic for units with VVER-440/213 reactors [1-5]. This document which was prepared in the period of 1994 - 1995 within the IAEA Extrabudgetary Programme contains explanations, classifications and recommendations related to the solutions of safety issues identified as topical for units with VVER-440/213 reactors. This material comprises all information on that type of reactors, available at the time. In its conclusions, the mission considered the Dukovany approach to safety enhancement as appropriate and effective[1-6].

Exchange of operational experience within framework of WANO

Nuclear power plant Dukovany is a member of World Association of Nuclear Operators (WANO) since 1990. Therefore, it makes use of the access to the international communication network, so called ”Nuclear Network”, which provides for a fast exchange of experience. That helps to increase the level of safety assurance by pooling international information on operational occurrences. Comparison of the NPP Dukovany parameters with those of world nuclear power plants shows that in a number of parameters the Dukovany plant ranks among the best quarter of the units in operation.

Joint activities of VVER-440/213 operators

Since 1990, nuclear power plant Dukovany participates in the joint effort of VVER-440/213 operators within the framework of so called ”VVER-440/213 Club”, which acts with the common objective - to support the safety enhancement process. Members of the Club prepared so called ”Minimal list of actions for the enhancement of nuclear safety” which is implemented at the individual plants and members of the Club inform each other on the progress and concerns of the implementation.

Significant benefit brings the direct co-operation with Slovak nuclear power plants Jaslovské Bohunice and Mochovce. Nuclear power plants likewise inform each other on specific technical solutions and programmes of the nuclear safety improvement. Very important is a direct notification of operational occurrences, their analysis and the corrective measures applied.

Supporting safety analyses within international technical co-operation projects

Since 1990, nuclear power plant Dukovany have been taking full advantage of opportunities provided by a number of international projects of technical co-operation, organised either by the IAEA, European Union or by individual countries on the basis of bilateral agreements. Such safety analyses, as for instance - evaluation of the piping systems integrity, probabilistic safety analyses (PSA, Level 1 and 2), efficiency analyses of the operational controls, analyses supporting the I&C replacement, studies of the technical documentation optimisation, were performed within the framework of those projects.

Evaluation of nuclear power plant Dukovany safety after 10 years of operation

In 1991, Decision of the State Nuclear Safety Supervisory Body (that time the Czechoslovak Atomic Energy Commission) established conditions to be fulfilled by the Operator to receive the license for further operation. New Safety Analysis Report submitted not later than 6 months prior the application for the continued operation license was a prerequisite. The revised Safety Analysis Report should have demonstrated the state of nuclear safety assurance for the individual units, using state-of-the art scientific and technical tools, and to compare it with the valid legal regulations, the IAEA recommendations and the results of international missions.

Thus, preparation of the new Safety Analysis Report included a number of supporting analyses and, in some cases, their results, provided suggestions for the enhancement of nuclear safety and reliability. Individual suggestions and proposals were then elaborated, analysed and incorporated by the Operator either into short- and medium-term measures or in the long-term modernisation programme under preparation.

Other requirements to the nuclear safety enhancement followed from the safety analyses of the individual units after 10 years of operation, and were formulated by the State Office for Nuclear Safety. Continued operation license issued by the SÚJB was based on the evaluation of :

- revised so called ”Operational Safety Analysis Reports”,
- special inspections performed by the Office,
- observance of the conditions established in the proceeding Decision of the Office,
- results of the finalised major overhauls.

The actual SÚJB decision on the further operation of individual units defines, besides requirements for additional analyses, the preparation of supplementing demonstrative documentation, proposal of the programme related to safety and reliability enhancement, as well as requirements for the implementation of individual measures by the certain deadlines. These requirements were incorporated into both the immediate measures and the planned modernisation programme (for more details see chapter 9.1.2 of this National Report).

Probabilistic Safety Assessment (PSA Study level-1)

The first PSA level 1 Study for nuclear power plant Dukovany was completed in 1993. Its results have been since made more accurate as a result of the improving knowledge of processes in a nuclear power plant, evaluation of successive technical changes implemented at the individual units and improvement of the model used in the probabilistic study itself.

The most important conclusion which followed from the PSA level-1 Study in 1993 was a possibility of further reduction of the probability of the core meltdown. In the course of the PSA level-1 preparation, at the end of 1991, a working team has been organised whose specific task was to propose, elaborate and implement crucial measures which should reduce impact of the dominant risks that may lead to core damage. Thus, the process of the identification and removal of the causes of such risks has started and it still continues within

the specified programme. This process became an integral part of both immediate partial improvements and the planned plant modernisation.

Probabilistic safety assessment approach has also been applied for establishing priorities of the planned modernisation steps.

Further information on the probabilistic safety assessment of the Dukovany units are in chapter 9.1.2.

Technical audit (internal, external)

The strategy selected for future modernisation effort at nuclear power plant Dukovany is based on the outputs of so called ”Technical Audit” which was organised as two consecutive stages:

- establishing current state of the plant equipment - performed within the framework of so called ”Internal Audit”,
- evaluation of the level of nuclear safety assurance - performed within the framework of so called ”External Technical Audit”.

Internal Audit

Current status of the plant equipment was, within the Internal Audit, assessed from the following standpoints:

- reliability and effect of the equipment on nuclear safety,
- failure rate of the equipment and the unit availability,
- demands for maintenance,
- service life of the equipment and availability of the spare parts,
- other effects.

For such assessment two approaches were used. The first was based on the results of the PSA level-1 Study; the second - deterministic one, was represented by an expert evaluation performed in accordance with the same guidelines which had been used by the IAEA for the elaboration of VVER generic Safety Issues, using as information sources the operational safety reports and other studies and analyses mentioned above.

Internal Audit was performed by the plant specialists, and it lasted from 1993 till July 1995. The first Technical Audit provided over-all evaluation of the individual units including proposal for the modernisation actions with regard to nuclear safety, reliability and operation economy.

External Audit

The External Audit supplied another independent evaluation of nuclear power plant Dukovany from the viewpoint of present international standards and generally accepted nuclear safety principles. This evaluation took place within the PHARE’93 programme (Project PH 4.2.9. -

Evaluation of Technical Safety of Dukovany and Jaslovské Bohunice VVER-440/213), and was performed by the European companies consortium (ENAC) in conformance with the IAEA guidelines for periodic safety assessment of nuclear power plants. The External Audit was carried out in co-operation with the SÚJB (which provided an expert opinion on the evaluation criteria). The Dukovany Safety Audit included the following steps:

- assessment of the Internal Audit course and outputs,
- development of a set of the safety evaluation criteria for nuclear power plant Dukovany based, in the first place, on IAEA standards (NUSS),
- factual evaluation for compliance with the developed criteria,
- preparation of the Final Report on the Dukovany safety evaluation from the standpoint of:
  - observance of safety principles (for instance the IAEA "Basic Safety Principles"),
  - conditions of normal operation,
  - selected abnormal operation and accident conditions.

Results of the External Technical Audit were published in its Final Report [1-9], which contains a set of recommendations for strengthening of the "defence-in-depth" concept in the plant design and operation and general guideline for implementation of these recommendations.

Technical audit, as a whole

The Final Report prepared as a result of Technical Audit as a whole (both internal and external) was published in the second half of 1995 [1-10]. The Report contains, besides results of the both Audit stages, also a basic description of the nuclear power plant, over-all evaluation of the operation and reliability, results of the evaluations performed within the operational safety reports of the units, as well as main results of the Probabilistic Safety Assessment (PSA Study level-1). Results of the Technical Audit form basis of the terms of reference of the planned modernisation of nuclear power plant Dukovany.

1.1.2.2 Implemented and planned programmes and measures for safety upgrading

Situation after Chernobyl accident

As a reaction on the Chernobyl accident, the government of the former ČSSR, by its Decision of November 1986, committed the Operator to back-fit the plant equipment and to partially modernise the plant. This decision was taken, similarly as in many other countries, even if physical and technical features the Chernobyl reactor were entirely different from the respective features of light water reactors installed at Dukovany. The implementation was carried out within the framework of so called "Back-fitting of Nuclear Power Plant Dukovany". The initial design for this back-fitting project was ready in 1990, and the implementation was launched in 1991. Among significant parts of the programme belonged:

- upgrading of the electrical fire detection system,
- installation of the stationary halon fire extinguishing system for electrical equipment,
- addition of the redundant train to the first category power supplies system No. IV,
- installation of the cooling system for the machine hall roof steel structure,
- equipping the central oil system by a stationary fire extinguishing device,
- installation of the hydrogen recombination system within the hermetic compartment,

- installation of a teledosimetric system.

Other actions after units start-up

Other partial modernisation implemented as a response to the nuclear safety related requirements and operational requirements comprised of: fire-proof spaying of the cables, installation of a public warning system, establishment of an Emergency Response Centre, preparation of new symptom-oriented operating procedures for mitigation of accident states, etc. Significant effort was spent in solving a number of problems of the end of fuel cycle - installation of compact grids in the spent fuel pool and construction of the interim spent fuel storage facility, the radioactive waste treatment line and radioactive waste storage facility.

Planned modernisation

Results of the analyses mentioned above, the SÚJB requirements set forth in the decisions on further operation of the individual units and operation experience have shown that additional upgrading is needed, in medium and long-term horizon. All this resulted in the preparation and systematic implementation of a complex “Modernisation Programme for Nuclear Power Plant Dukovany”.

Individual projects of this modernisation programme are at the moment at different stages of realisation - initial, pre-design preparation or preparation.

The most important projects already included into the modernisation programme are as follows:

- reconstruction of the I&C system,
- protection of the suction sumps of the spray pumps,
- replacement of emergency feedwater pumps,
- dislocation of the section collector of the emergency power supply system,
- modification of the equipment on the longitudinal floor + 14.7 m,
- partial reconstruction of the dieselgenerator stations I and II,
- extension of the spent fuel interim storage facility capacity.

A detailed list of the changes and planned improvements is in Appendix 1.

All what was said above should demonstrate a systematic approach to the evaluation and practical enhancement of Dukovany plant safety.

1.1.3 Nuclear power plant Temelín

1.1.3.1 Overview of safety assessments performed and the major results of those assessments

History of the project and its assessment

Decision on the construction of a nuclear power plant at Temelín site was taken in 1980 as a result of expert site selection for 4 nuclear units with VVER-1000 reactors. Contract on the supply from the former USSR of so called "Technical design" was signed in 1982. This design included machine hall, reactor and auxiliary buildings and dieselgenerator stations. Design of the secondary part of the plant was entirely in the hands of Czech party to the contract. The Basic Design of 1st and 2nd Temelín units was completed by the Czech "Architect Designer" organisation Energoprojekt (EGP) Praha in 1985. The site permit was issued in 1985 and construction permit in November 1986. Actual erection of the buildings was launched in February 1987, even if the preparatory work at the site had started in 1983.

Domestic specialists analysed and subsequently modified the original design as early as before 1989. After 1989, under new political and especially economical conditions, the demand of the Czech Republic for power of 4000 MW was re-evaluated and at the same time new analyses of the level of design safety were performed. The government of the Czech Republic in March 1993 decided that nuclear power plant Temelín will be finalised with two units. The date of fuel loading into the 1st unit is August 2000, into the second unit fuel will be loaded approx. 15 months later.

International expert appraisals

International missions to the Temelín site are dated from the beginning of nineties. These missions were invited for the purpose of independent appraisal of the original design and some other aspects of plant construction from the standpoint of internationally adopted standards.

In 1990 upon invitation from (that time) the Czechoslovak government the IAEA organised three international expert missions:

- mission aimed at the evaluation of site safety (April 1990),
- Pre-OSSART mission on the plant construction practice and on the preparation of safe operation (turn April/ May 1990),
- mission focused at the safety systems evaluation, core design and safety analyses (turn June/July 1990).

Missions stated that the design of nuclear power plant Temelín, its siting and organisation of construction did not show any significant deviations from the international practice. The final reports of those missions [1-12] [1-13] [1-14] offered some partial recommendations which should have contributed to safety enhancement. The recommendation were implemented in the changes and supplements to the design as well as in the organisation of the construction and preparation for future operation.

The follow-up Pre-OSSART mission took place in February 1992, it assessed to what degree the 1990 recommendations [1-15] were considered and implemented in the construction and in the preparation for future operation.

Among other significant activities of the IAEA with respect to nuclear power plant Temelín it should be especially mentioned:

- QARAT mission concentrated on quality assurance (turn March/April 1994) [1-16],
- consultants meeting on the Temelín design changes at the IAEA Headquarters in Vienna (turn November/December 1994) [1-17],
- mission focused at the fire protection (February 1996) [1-18].

A special mission of the IAEA in 1996 examined how Temelín plant has solved safety issues identified by the IAEA as generic for nuclear power plants with VVER-1000/320 type reactors [1-19]. The mission evaluated the innovated design, implementation of previously suggested alterations and the preparation for operation. This included the compatibility issues, i.e. compatibility of modern western technology with the original Russian design. In general, the mission concluded and highly commended that the future Operator had spent a significant effort in improving the plant design [1-20]. The mission emphasised that the combination of western and eastern technology in the Temelín design was considered very carefully, indeed. In mission's opinion, in some cases such combination of western and eastern technology resulted in a pronounced improvement of the safety assurance level, compared with international practice.

Another Pre-OSSART mission is planned for the beginning of 2000.

Analyses contracted by the future Operator

In addition to the activities listed above, the ČEZ, a.s., in 1991 contracted the American Consulting company Halliburton NUS to perform an audit focused at technical concept of the power plant and to verify whether the plant will be licensable with respect to standards accepted in the advanced countries. Audit reached the conclusion that the operation license may be obtained under the assumption that all the specified recommendations will be fulfilled as well as the requirements of the Regulatory Bodies [1-21].

Besides that, some analyses were performed by COLENCO (Switzerland) [1-22] and TUV Bayern e. V. (Germany) [1-23], which specifically assessed I&C design.

1.1.3.2 Main changes in the design and other measures for the enhancement of nuclear safety implemented as a result of the analyses

Results of the independent international expertises, organised by the IAEA, proposals of Czech specialists (including the SÚJB recommendations) and results of the NUS Haliburton audit were used as a basis for technical improvements which, when implemented, will assure that 1st and 2nd units of nuclear power plant Temelín will reach engineering standards usual for western power plants of the end of nineties.

Recommendations for the design improvement were handed over to the General Designer EGP Praha, which elaborated them as the supplements to the Basic and Detail design, in co-operation with other specialised companies and significant technology suppliers.

Among a number of improvements related to the replacement of components and systems, the following should be mentioned:

- replacement of I&C, including new design,
- replacement of nuclear fuel, including new core design,
- replacement of the original radiation monitoring system, including design,
- replacement and supplementing of the diagnostic system,
- replacement of original cables with fire-proof and non-propagating fire ones,
- significant changes in the electrical design **(**electrical protections, addition of 4th and 5th dieselgenerators, increased capacity of accumulators, etc.).

All significant changes and improvements are included into the table in Appendix 1.

All safety analyses were repeated, carefully taking into account the technical improvements and replacements, to complement preliminary safety documentation [1-24]. These analyses were performed with advanced western computer codes to the depth and in the structure required by western standards. Results of the probabilistic safety assessment studies level - 1 and 2 which were developed as well, will serve to complement the deterministic analyses in the assessment of the final configuration of the Temelín project.

1.2. Statement on implementation of the obligation concerning Article 6 – position of the Czech Republic as to further operation of nuclear installations with respect to safety aspects and to obligations in Article 6 of the Convention

All studies and analyses mentioned above unequivocally prove that the level of safety assurance at Dukovany units is sufficiently high and is in compliance not only with current requirements valid in the Czech Republic but also with internationally accepted practice. What more, this state of safety is systematically reviewed and evaluated from the viewpoint of state-of-the art scientific and technical information. Necessary upgrading activities are planned and implemented, so that this state will be similarly supported and even improved with time. Therefore the Czech Republic as a signatory of the Convention, in the case of nuclear power plant Dukovany takes all requirements following from Article 6 to be fulfilled, and consequently does not plan to reduce its operation, neither in short nor medium-term perspective.

Nuclear power plant Temelín, at the time of the National Report preparation, is at the stage when the design changes and their implementation are being actually finalised. Analyses performed until now demonstrate that nuclear power plant Temelín, when completed, will be conform to both current requirements valid in the Czech Republic and internationally recognised standards. This is why the Czech Republic plans to finalise and to commission this power plant according to the schedule.

2. Legislative and Regulatory Framework - Article 7 of the Convention

1. Each Contracting Party shall establish and maintain a legislative and regulatory framework to govern the safety of nuclear installations

2. The legislative and regulatory framework shall provide for:

(i) the establishment of applicable national safety requirements and regulations;

(ii) a system of licensing with regard to nuclear installations and the prohibition of the operation of a nuclear installation without a license;

(iii) a system of regulatory inspection and assessment of nuclear installations to ascertain compliance with applicable regulations and the terms of licenses;

(iv) the enforcement of applicable regulations and of the terms of licenses, including suspension, modification or revocation.

2.1 Description of the current situation

2.1.1 Development of national legislative and regulatory framework

Legislative and regulatory framework applicable for nuclear energy in the Czech Republic has a long history. Its beginnings go back to the middle seventies and are connected with the construction and operation of first nuclear power plants with VVER reactors in former Czechoslovakia.

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:

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

Regulation No. 83/1976 Coll. established that those three types of Safety Analysis Reports shall be an integral part of the documentation of constructions with nuclear installations.

Consequential to the regulations mentioned above, the following binding regulations were issued during 1978 - 1990:

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. also introduced some important basic definitions:

nuclear safety **-** as the condition and ability of a nuclear installation to prevent the uncontrolled development of fission chain reaction and inadmissible release of radioactive substances or ionising radiation to the environment,

nuclear installation **-** as a construction and operating unit containing nuclear reactor or a facility for storage, processing, disposal and transport of radioactive waste and fresh or spent nuclear fuel,

responsible organisation **-** organisation which performs construction and operation of a nuclear facility or transport of radioactive waste and nuclear materials.

Act No. 28/1984 Coll. established, for the first time, that responsibility for nuclear safety of a nuclear installation bears its Constructor, resp. Operator (Responsible Organisation).

That 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 programmes, of quality assurance programmes, as well as 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.

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 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.

2.1.2 Currently valid legislation in the area of utilisation of nuclear energy and ionising radiation

Entirely new stage in the formation of the state supervision started when the independent Czech Republic came into existence, at the turn of 1992/1993. Act No. 21/1992 Coll. established the State Office for Nuclear Safety which on January 1, 1993 took over, from the former ČSKAE, execution of the state supervision over nuclear safety.

Development of a new law has began practically at the same time, with the objective to re-codify utilisation of nuclear energy and ionising radiation, however, especially - to modify so far insufficiently regulated issues such as for instance - radioactive waste management, liability for nuclear damage, emergency preparedness and some others.

Parliament of the Czech Republic passed new act in January 1997 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 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 our nuclear programme, 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.

Full text of the Atomic Act and its implementing regulations is in Appendix 2 to this National Report.

The following international conventions and agreements to which the Czech Republic (or former ČSSR or ČSFR) has acceded are an integral part of the valid legislative framework:

- The Convention on Early Notification of a Nuclear Accident,
- The Convention on Assistance in the Case of a Nuclear Accident,
- The Treaty on Non-proliferation of Nuclear Weapons,
- The Agreement between Government of the Czech Republic and the IAEA on Safeguards,
- The Convention on the Physical Protection of Nuclear Installations and Nuclear Material,
- Vienna Convention on Civil Liability for Nuclear Damage (Third-Party Liability),
- The Joint Protocol relating to the Application of the Vienna and Paris Conventions on Liability for Nuclear Damage.

The Czech Republic is an active member of the Incident Reporting System (IRS) and the IAEA International Nuclear Event Scale system.

The obligation to inform on significant safety related events is also incorporated into bilateral agreements which have been signed by the Czech Republic:

- The Agreement between government of the Czech Republic and government of the Republic of Austria on regulation of the issues of mutual interest related to nuclear safety and radiation protection,
- The Agreement between government of the Czech Republic and government of the Federal Republic of Germany on regulation of the issues of mutual interest related to nuclear safety and radiation protection,

- The Agreement between government of the Czech Republic and government of the Hungarian Republic on regulation of the issues of mutual interest related to nuclear safety and radiation protection,
- The Agreement between government of the Czech Republic and government of the Slovak Republic on regulation of the issues of mutual interest related to nuclear safety and radiation protection,

The last items in the legislative framework are a series of the Recommendations and Guidelines published since 1978 by the State Office for Nuclear Safety as a special non-periodic edition: ”Safety of Nuclear Installations - Requirements and Guidelines”.

Licensing process, inspections and enforcement of observance of the regulations

So called ”licensing” process for nuclear installations is regulated by the Construction Act, the Atomic Act and the Environmental Act and related regulations.

Issuance of three basic authorisations for all nuclear installations, i.e. site permit, construction permit and operation permit from the standpoint of the Construction Act, is within competence of the corresponding local Construction Office.

In the case that in the course of the licensing proceedings arise issues protected by special regulations, the Construction Office decides by agreement or with consent of the State Administration Body which protects those particular interests. The Body concerned may condition its consent on the fulfilment of the conditions established in its decision issued in compliance with authorisation of the relevant specific law. Those Bodies are:

- Czech Industrial Safety Office - in issues of conventional safety, including safety of pressurised components and electrical systems,
- District Authority - in issues of fire protection,
  - in issues of waste management
  - in issues of water consumption and waste water discharge,
- Czech Environmental Inspection - in issues of air protection,
- District Office of Hygienic Service - in issues of possible impact to the workers health according to the Law No. 20/1966 Coll.

§ 126, para 3) of the Construction Act imposed upon the Construction Office obligation to demand that in the case of a project with nuclear installation, the applicant for the site approval, construction permit or supplementary construction permit shall submit, as a part of a licence application, the relevant regulatory decision issued by the SÚJB in compliance with the Atomic Act.

The Atomic Act establishes activities for which a licence issued by the SÚJB is required. Besides siting, construction and operation, a SÚJB licence is prerequisite also for a number of other activities, as for instance - for individual stages of nuclear installation commissioning, for reconstruction or other changes affecting nuclear safety, for discharge of radionuclides into the environment, etc. More detailed information is in chapter 3.2.1 of this National Report.

Act No. 17/1992 Coll., on the Environment, and especially act No. 244/1992 Coll., on Environmental Impact Assessment, impose an obligation to assess constructions from the viewpoint of their impact on the environment (to perform ”Environmental Impact Assessment”) within a special proceedings accessible to the public, either through the respective community, which is a party to the proceedings, or through the registered civic initiatives. The Ministry of Environment is the State Administration body responsible for the decision with regard to the environmental impact of the nuclear power plant.

Control activities of the SÚJB are set forth in § 39 of the Atomic Act as well as in Act No. 552/1991 Coll. on State Inspection and Monitoring in the wording of Act No. 166/1993 Coll.

Instruments, applied to enforce the legislative requirements are regulated by § 40 and 41 of the Atomic Act, set down the SÚJB authority to require the inspected person to remedy the situation, to perform technical inspections, revisions or the functional ability tests, to withdraw the special professional competence authorisation issued and to impose penalties for violating obligations established in the Atomic Act.

In the event of a hazard arising from delay, the SÚJB is authorised to impose the obligation to reduce the power output or to suspend operation of the nuclear facility. Issues of alteration, cancellation and cessation of a licence are regulated by § 16 of the Atomic Act, especially important is para 4) which authorises the SÚJB to restrict or to suspend performance of the licensed practice if the licensee ceased to fulfil his/her obligations.

For more details of the legislation mentioned above and of the licensing procedure see especially chapters 9, 10, 11, 12, 13 and 13 of this National Report.

2.2 Statement on implementation of the obligation concerning Article 7

System of the described legal documents - laws, decrees, international conventions and intergovernmental agreements - together with series of recommendations and guidelines fulfils, by its nature and contents, requirements established in paragraphs 1 and 2 of the Article 7 of the Convention.

3. Regulatory Body - Article 8 of the Convention

1. Each Contracting Party shall establish or designate a regulatory body entrusted with the implementation of the legislative and regulatory framework referred to in Article 7, and provided with adequate authority, competence and financial and human resources to fulfil its assigned responsibilities;

2. Each Contracting Party shall take the appropriate steps to ensure an effective separation between the functions of the regulatory body and those of any other body or organisation concerned with the promotion or utilisation of nuclear energy.

3.1. Description of the current situation

3.1.1 Mandate and competence of the Regulatory Body

The State Office for Nuclear Safety was established on 21.12.1992 by law of the Czech National Council No. 21. After dissolution of the Czech and Slovak Federate Republic, it assumed function of the former ČSKAE in carrying out State supervision of nuclear safety and nuclear materials. In the period 1993 - 1995 the SÚJB authority has been regulated by Act No. 287/1993 Coll., on Competence of the State Office for Nuclear Safety and related measures. In July 1996 the Office competence has been extended by act No. 85/1995 Coll. to include the issues of protection against ionising radiation. Thus, Czech Regulatory bodies for the areas of nuclear safety and radiation protection were combined into one, and the SÚJB has become an integrated body of the State administration which carries out the State supervision for the whole area of the utilisation of nuclear energy and ionising radiation.

Since June 1997, the SÚJB competence has been established by the new act No. 18/1997 Coll., on Peaceful Utilisation of Nuclear Energy and Ionising Radiation (the Atomic Act), and according to its Article 3:

(1) 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 (hereafter referred to as "the Office").

(2) 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 intermidiary 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.*

3.1.2 Rights and responsibilities of the Regulatory Body

Article 9, para 1 of the Atomic Act establishes precondition for the utilisation of nuclear energy and ionising radiation as follows:

(1) A licence issued by the Office is required for:

a) siting of a nuclear installation or a workplace with very significant ionising radiation source;

b) construction of a nuclear installation or a workplace with very significant ionising radiation source;

c) particular stages, laid down in an implementing regulation, of nuclear installation commissioning;

d) operation of a nuclear installation or a workplace with significant or very significant ionising radiation source;

e) restart of a nuclear reactor to criticality following a fuel reload;

f) reconstruction or other changes affecting nuclear safety, radiation protection, physical protection and emergency preparedness of a nuclear installation or a workplace with significant or very significant ionising radiation source;

g) decommissioning of a nuclear installation or a workplace with significant or very significant ionising radiation source; the decommissioning process shall be established in an implementing regulation;

h) discharge of radionuclides into the environment;

i) ionising radiation sources management to the extent and in the manner established in an implementing regulation;

j) radioactive waste management;

k) importation or exportation of nuclear items or transit of nuclear materials and selected items;

l) nuclear materials management;

m) transport of nuclear materials and radionuclide sources laid down in an implementing regulation; this licence does not relate to the person performing the transport, or to the carrier, unless he is simultaneously the shipper, or consignor or consignee;

n) professional training of selected personnel of nuclear installations and selected personnel of workplaces with an ionising radiation source;

o) re-importation of radioactive waste originated in the processing of materials exported from the Czech Republic.

Other provisions of the Atomic Act regulate:

- conditions on which a licence is issued (Article 10),
- probity and professional competence (Articles 11 and 12),
- application for a licence (Article 13),
- administrative proceedings of the SÚJB (Article 14),
- requisites of licence (Article 15),
- alternations, cancellations and cessation of licence (Article 16).

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:

- control 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. The SÚJB checks

whether the bodies who obtained a licence in accordance with Article 9, para 1 are observing the Atomic Act and other relevant regulations.

The SÚJB staff who carry out such checks are inspectors of nuclear safety and radiation protection appointed by the Chairman of the SÚJB. They work at the SÚJB office and directly at the sites of nuclear power plants Dukovany and Temelín, as well as in the Regional Centres (see Chapter 3.1.3 of this National Report). Within the framework of their inspection activities, inspectors and also the Chairman of the SÚJB, are authorised, in particular, for:

- 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 is imposed.

The SÚJB is authorised, if there is danger in case of delay or 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 perfumed by another person, by the expense of the inspected person.

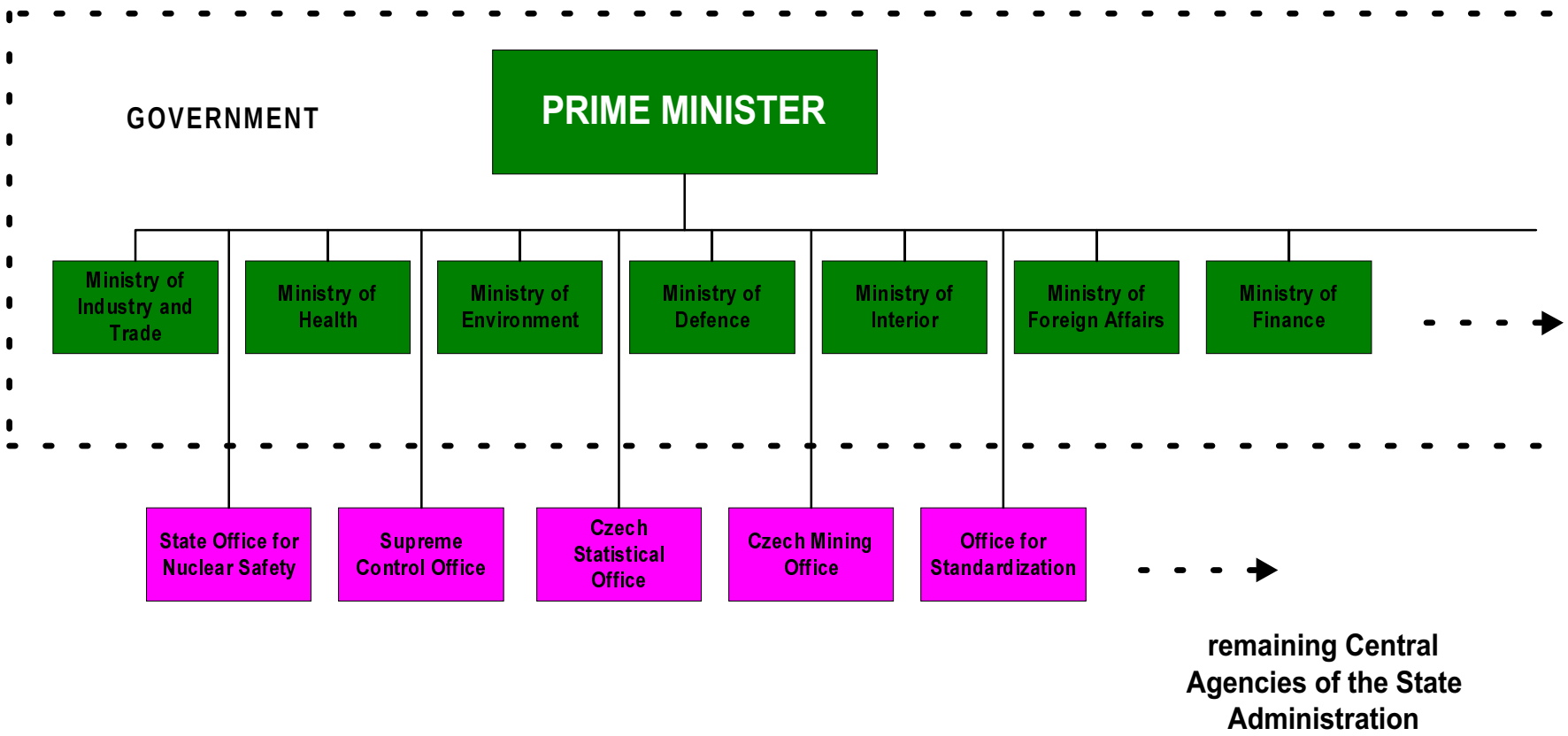
For violation of a legal obligation established in the Atomic Act, the SÚJB may impose a penalty, up to the amount specified in Article 41 and in compliance with rules specified in Article 42.

The binding procedures for inspection activities are set forth in the SÚJB internal documents.

3.1.3 Position of the Regulatory Body within the State administration structure

The SÚJB is an independent central State administration body for the area of nuclear safety and radiation protection. It has its own budget approved by the Parliament of the Czech Republic as a part of the State budget. The SÚJB is headed by the Chairman who is appointed by the government. The SÚJB position within the State administration structure is shown in Fig.3-1.

Statute of the State Office for Nuclear Safety within the State Administration



3.1.4 Structure of the Regulatory Body, its technical support, material and human resources

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 is 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.

Organisational structure of the SÚJB is presented in Fig. 3-2, and it is composed of:

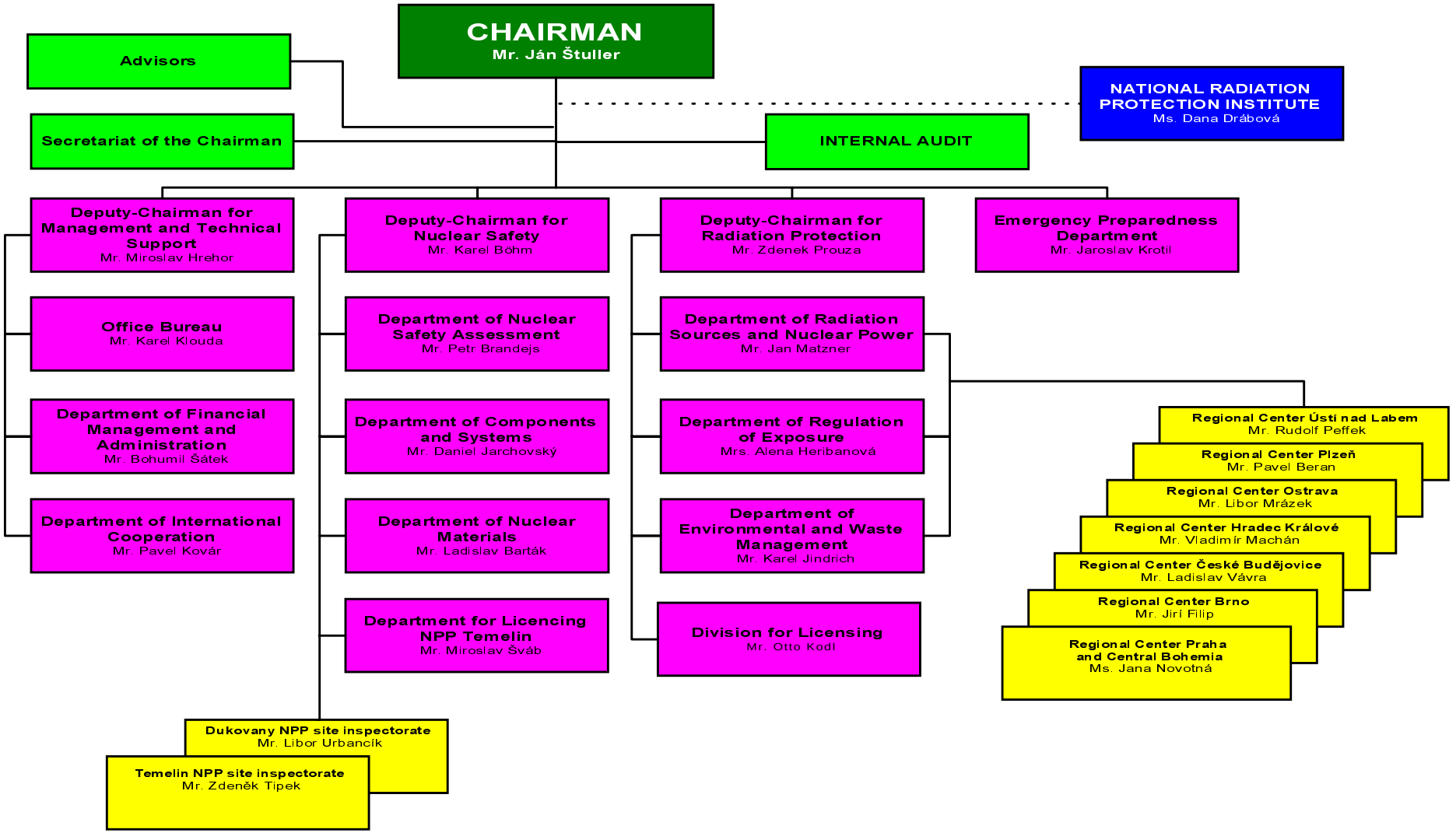
- Section of Nuclear Safety, which includes Department of Nuclear Safety Assessment, Department of Components and Systems, Department of Nuclear Materials and Department of Nuclear Power Plant Temelín Licensing,
- Section of Radiation Protection, which includes Department of Radiation Sources Application, Department of Natural Radiation Sources, Department of Radiation Protection at Nuclear Installations and separate unit of the Health aspects of Radiation Protection,
- Section of Management and Technical Support which includes International Cooperation Department, Financial Department and Office Bureau,
- Independent Department of Emergency Preparedness (reporting directly to the SÚJB Chairman), which performs function of an Emergency Response Centre and co-ordinates the Radiation Monitoring Network,
- Regional SÚJB Centres in Prague, Plzeň, České Budějovice, Ústí nad Labem, Hradec Králové, Brno and Ostrava, which are subordinated to the Radiation Protection Section,
- Local workplaces of the Nuclear Safety Section at both nuclear power plants sites (Dukovany and Temelín).

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.

ORGANIZATIONAL CHART OF THE STATE OFFICE FOR NUCLEAR SAFETY



3.1.5 Relations of the Regulatory Body to other State administration bodies

Both the enumerated legislative documents and the state administration structure document, that the SÚJB authorities are sufficient for carrying out its mandate - performance of the State supervision of nuclear safety and radiation protection. At the same time, the SÚJB activity does not either coincide or contradict that of any other State administration bodies.

3.2 Statement on implementation of the obligation concerning Article 8

Position of the Regulatory Body within State administration structure of the Czech Republic and existing legislation are fully conform to Article 8 of the Convention.

4. Responsibilities of License Holder - Article 9 of the Convention

Each Contracting Party shall ensure that prime responsibility for the safety of a nuclear power installation rests with the holder of the relevant license and shall take the appropriate steps to ensure that each such license holder meets its responsibility.

4.1. Description of the current situation

Responsibility of a licensee for nuclear safety of his/her nuclear installation has been explicitly established already by Act No. 28/1984 Coll. on state supervision of nuclear safety at nuclear installations (see Chapter 2 of this National Report).

In accordance with the current legislation, this basic principle was elaborated into the form of a number of partial responsibilities which, taken together, represent the over-all responsibility of a licensee for nuclear safety. Those partial responsibilities are elucidated in Articles 17 and 18 of Act No. 18/1997 Coll., on Peaceful Utilisation of Nuclear Energy and Ionising Radiation (The Atomic Act); para 1, letter a) of Article 17 requires that a licensee shall, besides other, ensure nuclear safety, radiation protection, physical protection and emergency preparedness of his/her nuclear installation, then - the prerequisites of the licensee safety assurance system follow, such as:

- systematically assess and maintain nuclear safety and radiation protection, applying the most advanced tools of science and technology,
- comply with technical and organisational conditions of safe operation, with the conditions of the licence, with the approved quality assurance programmes,
- investigate, without delay, any violation of those conditions and take remedial measures and measures preventing repetition of such situations,
- report, without delay, about events important for nuclear safety
- and other.

One of the main authorities of the State supervision of nuclear safety is control of fulfilment and adherence to these requirements. This right is exercised by the SÚJB inspectors of nuclear safety and radiation protection in accordance with Article 39, para 4, letters b) and c) of the Atomic Act which state that inspectors 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 operating procedures, and demand evidence of fulfilment of the whole set of these obligations. Important obligation of licensees is liability for nuclear damage caused by operation of their nuclear installations (Article 33 of the Atomic Act).

4.2 Statement on implementation of the obligation concerning Article 9

The current legal regulation of the basic responsibility of licensees for nuclear safety of their nuclear facilities is defined in accordance with requirements introduced in Article 9 of the Convention.

5. Priority to Safety - Article 10 of the Convention

Each Contracting Party shall take appropriate steps to ensure that all organisations engaged in activities directly related to nuclear installations shall establish policies that give due priority to nuclear safety.

5.1. Description of the current situation

5.1.1 Principle of priority to nuclear safety in the Czech legislation

Principle of "Priority to Safety" has been incorporated into the highest legal instrument, which in the Czech Republic is Act No. 18/1997 Coll. on Peaceful Utilisation of Nuclear Energy and Ionising Radiation (The Atomic Act). Section two of this Act established general conditions for the performance of practices related to the utilisation of nuclear energy. Article 4, para 3 of the Act unequivocally established that:

"Anybody, who utilises nuclear energy or provides practices leading to exposure or provides interventions to reduce exposure from natural sources or exposure resulting from radiation incident, shall act in such manner, that ensuring nuclear safety and radiation protection has the priority."

This principle is maintained in all implementing regulations which in the Czech Rule of Law are consequential to the Atomic Act and details its basic requirements. These Regulations are presented in Chapter 2 of this National Report. Adherence to these requirements is binding for whoever performs or contracts or otherwise assures activities related to the utilisation of nuclear energy, i.e. - for designers, manufacturers, operators, as well as for the state regulatory bodies.

5.1.2 Implementation of principles established in the legislation

ČEZ, a.s., strategy in the area of nuclear safety, priority to safety principle, safety culture

Obligation of "priority to safety" expressed the sole holder of a licence for operation and construction of nuclear installations in the Czech Republic - company ČEZ, a.s. - in its safety strategy proclaimed in June 1995 [5-1]. "Strategy" comprises the company obligation to maintain nuclear safety and it established the safety priority with respect to construction and operation of nuclear power installations. The document is drawn in accordance with the basic principles of safety culture described in the IAEA document "Safety Culture" [5-2] . The "Strategy" was issued as the company top level document, in the form of the Board of Directors Decision. To make it familiar to the ČEZ, a.s., staff, it was also published as a leaflet with the Chairman of the Board foreword. As a follow-up, both company's nuclear power plants elaborated their own safety strategy, for their particular conditions. The ČEZ, a.s., staff, on all levels, has been acquainted with the strategy of their company and linked-up strategies of two nuclear power plants with the objective to engage the individuals in the

common effort to fulfil the established strategic targets. The ”Strategy” is regularly refreshed in personnel’s memory at the opportunities of ”training days”.

Basic strategic targets defined in the “Strategy” are worked out in more detail in the company document ”Safety Rules for the Area of ČEZ Nuclear Activities” [5-3]. This document defines the main principles of nuclear safety and radiation protection, adherence to which is binding for all nuclear activities, and establishes the relevant responsibilities and authorities within the company structure.

Safety strategy of nuclear power plant Dukovany [5-4] presented in the appendix to the internal document Nuclear Safety Rules [5-5] is closely related to its main company’s strategy. This document explicitly states that the plant management is aware of and is respectful of its responsibility for nuclear safety of the nuclear installation, and undertakes that in all safety related activities the best possible results shall be achieved. Nuclear safety has a highest priority, and nuclear safety requirements stand higher than operation requirements. To accomplish these objectives, nuclear power plant Dukovany developed a complex mechanism which comprises documents of different level, system of regular assessments and system of control. All employees are, in their activities, obliged to observe the rules so that probability of the non-standard events occurrence is minimised. One of the tools for systematic assessment of the level of nuclear safety are nuclear safety factors, likewise defined in the Appendix to mentioned system document ”Nuclear Safety Rules”. Such set of factors characterises development of the nuclear safety level at nuclear power plant Dukovany during last month (year). Most significant safety issues related to the Dukovany plant operation solves specially assigned Technical Safety Group. This Group meets regularly 4 times a year, its members are representatives of all technical divisions of the plant, representatives of ČEZ Headquarters and representatives of NRI Řež, plc, which provides technical assistance to the plant. During its meetings, the Technical Safety Group reviews and proposes concepts for solution of significant safety problems, it also evaluates the implemented solutions and the safety factors mentioned above. All information about the safety related activities is given to the Regulatory Body - the SÚJB. An integral part of the strategy is also openness of nuclear power plant Dukovany in informing the general public and foreign subjects on its nuclear safety.

The similar structure is observed at nuclear power plant Temelín. The Temelín safety strategy [5-5] establishes the main safety priorities of the power plant emphasising construction and preparation for the operation, there is also follow-up document ”Nuclear Safety Rules” and some other documents.

The ČEZ company and both nuclear power plants take sufficient care to maintain the high level of nuclear safety and to increase it in a controlled manner, similarly the attention is paid to the financial aspects of safety (see Chapter 7 of this National Report).

Supervision of nuclear safety

The Atomic Act, which defines ”priority to safety” principle, is for the SÚJB a basic legal document for the performance of the State supervision over the nuclear safety and radiation protection. As it follows from Chapter 3 of this National Report, all SÚJB activities, its organisational structure and work procedures are guided by this principle. Independent

position of the SÚJB within the State administration, as well as the fact that it is funded directly form the State budget, sufficiently guarantee its main purpose.

Within its competence (see Chapter 3.1.2 of this National Report), the SÚJB also checks on the fulfilment of ”priority to safety” principle, established by the Atomic Act, in the course of all practices related to the utilisation of nuclear energy, performed by other subjects. All organisations which participate in design, manufacturing, construction and operation of nuclear power plants are subject of the SÚJB checks which assess especially the management approach to the safety related issues, and how individuals performing safety related activities are motivated in the sense of safety culture.

5.2 Statement on implementation of the obligation concerning Article 10

The principle of priority to safety, established in Article 10 of the Convention, is in the Czech Republic adhered to.

6. Financial and human resources - Article 11 of the Convention

1. Each Contracting Party shall take the appropriate steps to ensure that adequate financial resources are available to support the safety of each nuclear installation throughout its life.

2. Each Contracting Party shall take the appropriate steps to ensure that sufficient numbers of qualified staff with appropriate education, training and retraining are available for all safety-related activities in or for each nuclear installation, throughout its life.

6.1. Description of the current situation

6.1.1 Financial covering of nuclear safety enhancement at nuclear installations in the course of their operation

Act No. 18/1997 on Peaceful Utilisation of Nuclear Energy and Ionising Radiation (the Atomic Act) established as one of the general conditions that any person performing or providing nuclear practices must have an implemented quality assurance system (Article 4, para 7). This condition was imposed with the objective to achieve the required quality and organisational assurance of such activities with regard to their importance for nuclear safety and radiation protection. Quality Assurance programmes for the specified practices shall be approved by the SÚJB.

Documentation of the license holder - ČEZ, a.s. - quality assurance system includes an obligation to arrange for adequate financial resources available for safety assurance over the whole service life of company's nuclear power plants. Article 5.3.2. of the ČEZ Top Level Quality Assurance Programme [6-1] defines that:

"Company's business plan and budget is prepared in accordance with approved Procedures. These Procedures include organisational arrangements to assure adequate financial resources related to maintenance and enhancement of nuclear safety."

In connection with Top Level Quality Assurance Programme, provision of adequate resources for the major investments important to nuclear safety, is detailed in the relevant procedures and methodical documents.

Investment programmes, developed and approved at the nuclear power plant level, are included into the investment programme of ČEZ, a.s. In accordance with the project development and approved documentation, appropriate financial resources are then included into the company's investment budget for the corresponding year.

6.1.2 Provisions for assurance of financial and human resources for the decommissioning of nuclear installations and management of radioactive waste generated during their operation

Radioactive waste

The radioactive waste management, including those generated at nuclear power installations, is regulated by section four of the Atomic Act (Articles 24 - 31). § 24 stipulates:

“ An owner of radioactive waste or other natural person or legal person managing the assets of an owner in such a manner that radioactive waste is generated (hereinafter referred to as a "generator") shall bear all costs associated with its management, from its time of origin to its disposal, including monitoring of radioactive waste repositories after their closure, and including the necessary research and development activities.”

Further, in § 25 it is stated:

“Under the terms of this Act, the State guarantees safe disposal of all radioactive waste, including monitoring and supervision of repositories after their closure.”

Financial means to be used to cover costs of waste (and spent fuel) disposal are deposited by the licensee on a special interest-bearing account opened with the Czech National Bank, the “nuclear account”. The Ministry of Finance manages the nuclear account, which is included among the accounts of State financial assets and liabilities, the utilisation of which is decided by the Government. Resources in the nuclear account may only be used for purposes within the provisions of this Act. Amount and manner of payments to ”nuclear account” are subject of the Czech government decision made upon a proposal of the Radioactive Waste Repositories Authority. The Authority is a governmental organisation instituted in accordance with the Atomic Act to carry out activities related to radioactive waste disposal. The Act also establishes how the Authority shall be financed, and the subject of its activity.

The radioactive waste management (as well as that of non-active waste, decontamination and technical questions of decommissioning) at ČEZ company’s nuclear power plants is controlled by the special organisational units which are a part of Department of Safety or Department of Technical Support. Personnel training is carried out within the framework of the unified Training system (see also chapter 7.1.3 of this National Report).

Decommissioning

One of the basic obligations of a licensee set in Article 18, para 1, letter h) of the Atomic Act is the obligation to steadily create financial reserves for the preparation and actual decommissioning of nuclear installations. The amount of this reserve is established on the basis of the decommissioning technology approved by the SÚJB and then verified by the Radioactive Waste Repositories Authority. A proposal for the decommissioning method has been already approved for nuclear power plant Dukovany, and the financial reserve for decommissioning of ”active” buildings (technologies) is and will be created over the whole of the plant service life. Process of creating such reserve for nuclear power plant Temelín will be launched after the plant is commissioned. Proposal of the decommissioning method for

nuclear power plant Temelín (one of the documents necessarily submitted with the application for the licence) is at present worked out.

The ČEZ, a.s., decommissioning documentation is being prepared by a multiprofessional team with representatives from the ČEZ, a.s., headquarters (co-ordinator) and from both nuclear power plants. This team administrates technical, financial, investment and organisational issues of decommissioning, including provision of the appropriate human resources. Assignment of the team and all activities carried out for the purpose, are in compliance with the quality assurance requirements established by the ČEZ, a.s., in its quality assurance programmes for nuclear activities.

6.1.3 Rules, regulations and provision of resources for qualification, basic training and regular training (including simulator training) of the personnel whose activities have impact on nuclear power installations safety

Legislation

The Atomic Act sets forth conditions under which nuclear energy and ionising radiation may be utilised. Article 17, para 1, letter i) introduces as one of the general obligations of licensees:

" entrust performance of the specified activities only to such persons as fulfil conditions of special professional competence and meet requirements verified in a manner established in a specific regulation, and in good physical and mental health"

According to Article 18, para 1, letter o) the licensee is also obliged to:

" provide a system of training, verification of competence and special professional competence of personnel in accordance with the importance of the work they perform"

Conditions for performance of activities directly influencing nuclear safety are established in Article 18, para 3 of the Atomic Act. Such activities may only be performed by natural persons who are physically and mentally competent, with professional competence, and to whom the SÚJB has granted an authorisation for the activities in question, upon an application by the licensee. Physical and mental competence are examined by the health and psychological institutions pointed out by the SÚJB in accordance with the requirements to and work-load of the persons to be examined.

Professional training of selected personnel of nuclear installations may, according to Article 9, para 1, letter n) of the Atomic Act, be organised by a natural or juristic person only on the basis of a license granted by the SÚJB. Documentation required for the issuance of such a license is listed in Appendix to this Act.

Regulation of the SÚJB No. 146/1997 Coll. in compliance with the cited provisions of the Atomic Act, specifies activities which have direct impact on nuclear safety and activities important for radiation protection, requirements for competence, professional training, method of verification of special professional competence and authorisation of selected personnel, as well as format of required documentation for the selected personnel training licence.

These legal regulations were supplemented by the Safety Guide [6-2] published in April 1994 by the SÚJB, covering area of professional training of personnel for the performance of the work activities (functions) at Czech nuclear installations. This Guide specified criteria and provided methodical guidelines for training of the nuclear operators, and personnel of natural and juristic persons whose activities at nuclear installations (functions) are important for nuclear safety - with the objective to minimise risk caused by human error.

Legislative requirements to the holder of operation or construction license

Task of a methodical and professional training guarantee within the ČEZ, a.s., is entrusted to the Training Centre of Nuclear Power Installation Brno, which is a part of the Personnel Section of ČEZ Headquarters. The main mandate of the Training Centre consists in training personnel for both nuclear power plants as well as for external suppliers. It is also, in accordance with internal documents, responsible for establishing concept, strategy and system of the professional training for all nuclear activities of ČEZ, a.s., company [6-3], [6-4], [6-5], [6-6], [6-7].

Both nuclear power plants have their own documented systems of training. Thus, there is a complex of mutually interlined activities, systematically implemented in compliance with the legal regulations valid in the Czech Republic and with the internal documents.

Concept of qualified personnel training at nuclear power plant Dukovany

Nuclear power plant Dukovany as an operator of the nuclear installation bears the responsibility that professional competence and special professional competence of its personnel is such that it will not adversely affect nuclear safety and radiation protection level of the nuclear power plant. For each position the quality assurance manual of each plant's department establishes requirements for: education, practice, health and psychic competence, probity and especially - for continued professional training of the personnel, before they start to perform their respective activities. The objective of training is to assure that each individual will have command of necessary knowledge, skills and habits required for achieving, maintaining and developing the relevant professional competence. Fulfilment of this objective is verified by examinations and then formalised by issuing the employer's authorisation for the performance of the activity in question.

Professional training at the nuclear power plant Dukovany issues from the Czech system of education. A significant share of employees are university graduates (approximately 30 %) or technical high school graduates (30 %). That is why, the training process at Dukovany plant is focused at complementing their specific knowledge in the area of nuclear power plants, and at acquiring practical professional competence and skills necessary for performance of the work in question. Special attention is paid to the units control rooms operators (selected personnel). Training of that personnel is always concluded by an examination before the State Examination Commission.

Professional training as a process is composed of *Specific training* and *Professional training.* In turn, Specific training is divided into *Basic training* and *Regular training. Professional*

training is composed of *Specialised training* and *Periodic training.* Interconnection of the individual stages of the training is obvious from Fig. 6-1 and 6-2.

Process of personnel training starts with recruiting and selection of workers. New workers are always selected according to the criteria established in the internal instruction ”Personnel and social policy rules” [6-8]. Verification of health and psychic capability of employees are part of the selection process for their future positions. The Personnel section of nuclear power plant Dukovany is responsibility for this area.

Next subject in the training process is Training Centre of nuclear power plant Dukovany which provides for training of plant’s personnel and personnel of its external suppliers under the condition that responsibility for the professional competence (qualification) of subordinates always bears their superior, on all levels of management. Controlling principles of the process of training applied for nuclear power plant Dukovany own personnel and that of its external suppliers are described in the internal regulation Rules for Personnel Training [6-9]. The Training Centre provides different types of theoretical training as well as practical training, appropriately recording and documenting it. The Training Centre acts also as a manager of Central Files of personnel qualification maintained for each work activity performed at each sections of the nuclear power plant. The Training Centre is responsible for application of new training methods and training tools which should improve efficiency of training.

Since the project of development and implementation of either multifunctional of full-scope simulator for nuclear power plant Dukovany is still not finished, both basic and periodic training relay on full-scope simulator of the Training Centre at VÚJE Trnava (the Slovak Republic).

Basic, periodic and professional training of Dukovany personnel

Basic training serves to acquire or to improve specific professional capability necessary for performance of any given activity. Basic training is obligatory for each employee who performs work activity important for nuclear safety or radiation protection. Basic training is designed for new employees and the employees trained for different work.

Employees are assigned to one of the training groups according to their work activity and professional specialisation. From the standpoint of nuclear safety the 5 following groups are defined, for:

- management,
- selected personnel,
- employees of technical departments,
- shift and non-shift personnel,
- maintenance personnel.

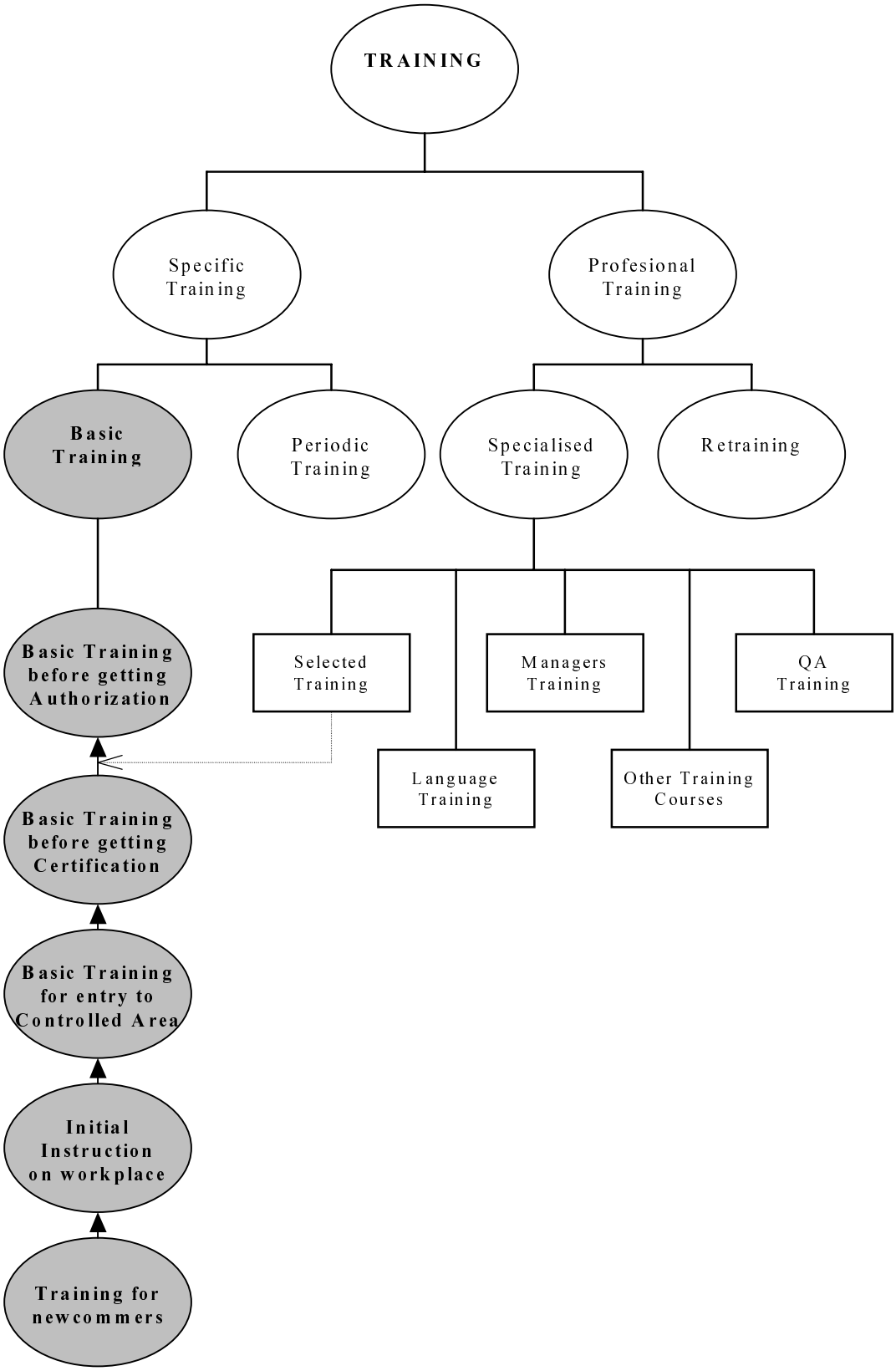
From the aspect of radiation protection, in accordance with Regulation No. 184/1997 Coll., three types of groups were defined :

- selected personnel,
- personnel who handle sources of ionising radiation,
- other employees.

Training is carried out in compliance with the training programmes prepared in cooperation between the Training Centre - nuclear power plant.

Basic training is realised in three consecutive steps shown in Fig. 6-1.

Fig. 6-1


TRAINING
Specific Training
Profesional Training
Basic Training
Periodic Training
Specialised Training
Retraining
Basic Training before getting Authorization
Selected Training
Managers Training
QA Training
Language Training
Other Training Courses
Basic Training before getting Certification
Basic Training for entry to Controlled Area
Initial Instruction on workplace
Training for newcommers

The form of basic training depends on the training programme, training group and specialisation, there are the following forms:

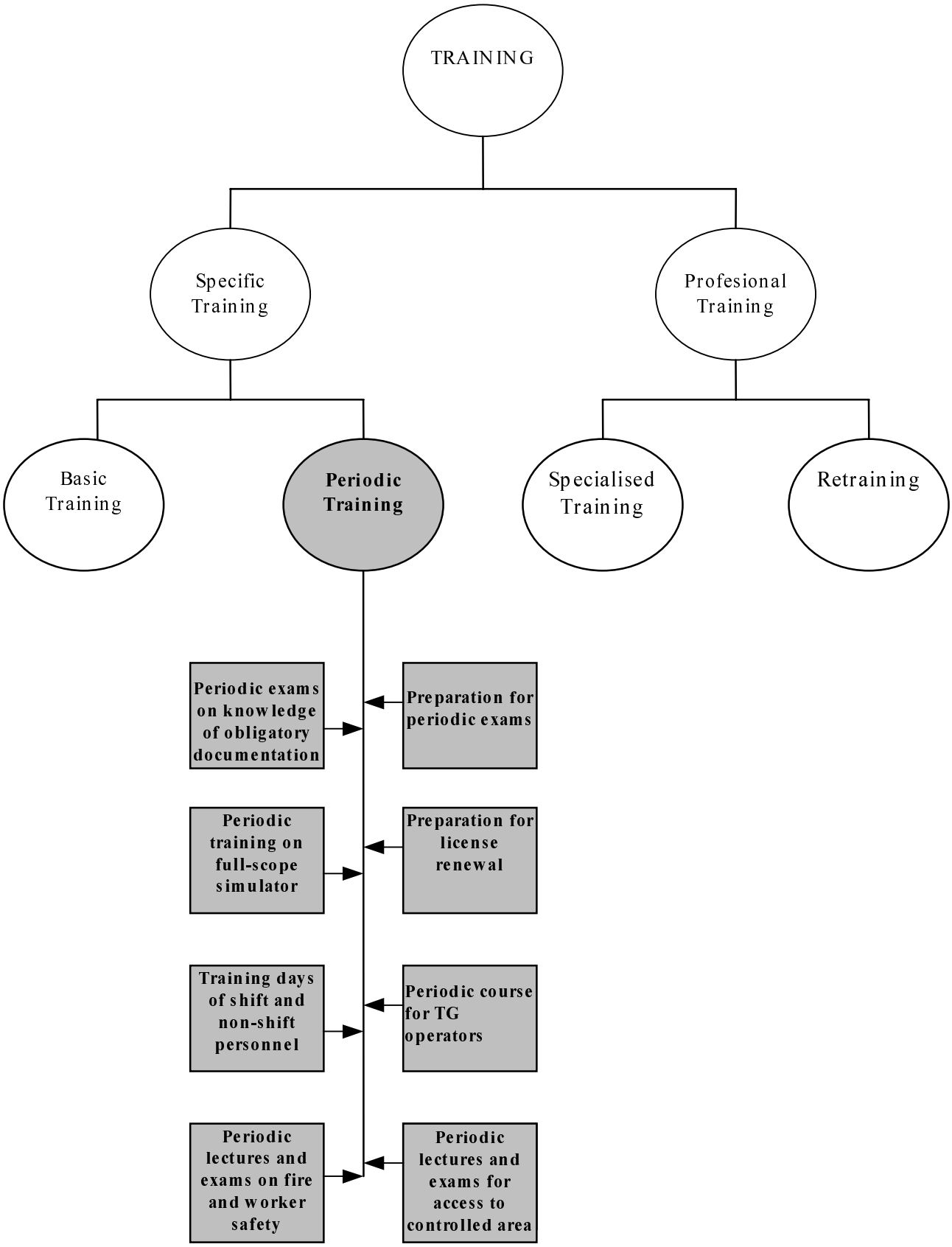
- theoretical training,
- short-term attachment at nuclear power plant,
- training on full-scale simulator,
- examination for a certificate
- training for a specific function
- hands-on training at workplace,
- examination for authorisation, authorisation for work activity.

The individual linked-up parts of theoretical and practical training are combined into modules, and the whole duration of basic training varies from 6 to 90 weeks depending on the type of work to be performed after training.

Periodic training serves to maintain, update or deepen specific professional competence of an employee, required for the performance of his work. Each employee who performs activity important for nuclear safety or radiation protection, is obliged to go through periodic training.

Training is carried out in accordance with approved training programmes which are organised as it is shown in Fig. 6-2.

Fig. 6-2


TRAINING
Specific Training
Profesional Training
Basic Training
Periodic Training
Specialised Training
Retraining
Periodic exams on knowledge of obligatory documentation
Preparation for periodic exams
Periodic training on full-scope simulator
Preparation for license renewal
Training days of shift and non-shift personnel
Periodic course for TG operators
Periodic lectures and exams on fire and worker safety
Periodic lectures and exams for access to controlled area

The form of periodic training depends on the training programme, training group and specialisation, there are the following forms:

- theoretical training (training days, safety of work, fire protection, emergency preparedness, access to controlled area, etc.),
- training on full-scope simulator,
- training and examination for authorisation or certificate.

Duration of the individual forms of the annual periodic training varies from several hours to two weeks (simulator) depending on the type of work to be performed after training.

Training for a specific profession serves to maintain, update, deepen or improve the specific professional competence of an employee, required for the performance of his work. Each employee whose work belongs among ”nuclear activities”, is obliged to go through professional training. This training includes some or all forms shown in Fig. 6-1, either as specialised or regular one. Passing through professional training is very important for those employees who perform activities important for nuclear safety or radiation protection, since it represents a precondition for continued validity of the Authorisation. Duration of this training depends on the type of work activity and may be carried out as a single training or as long-term courses.

Professional training for employees of external suppliers

Process of professional training applied in the case of external suppliers employees is similar as for plant’s own personnel, however, with emphasis on the activities related to maintenance and repair of the equipment. Basic structure of training is obvious from Fig. 6-1 and 6-2. Requirements for the professional capability of external personnel follow from their assignment to the realisation groups. Types of training obligatory for the particular employee are established using an expert approach in compliance with ISO standards, the SÚJB Regulation No. 214/1997 Coll. and relevant international recommendations. Detailed requirements for each type of training are included into internal documents. External suppliers are obliged to develop and document their own system of training, including evidence of how requirements for the particular professional capability are fulfilled.

Nuclear power plant Temelín

Preparation of qualified personnel in the case of nuclear power plant Temelín basically follows the same scheme as that developed for Dukovany.

However, while selected personnel of Dukovany is until now trained on the Slovak VVER-440 simulator, personnel of Temelín will be trained on full-scope simulator directly at the site, guided by Temelín own Training Centre. Training, conform to the binding regulations, will take place not later than 6 month before fuel loading at first unit. Full-scope simulator VVER-1000 of nuclear power plant Temelín is in advanced stage of development. Operators environment was designed as identical to the control room environment, also the civil-construction part of the simulator hall will be arranged accordingly. Simulation of the technology and technological processes will be carried out on advanced computer system of SILICON GRAPHICS computers. Information and control system of the simulator is created

by an original WDPF system supplied by WESTINGHOUSE. The same company will supply the simulator's control boards and instrumented panels - identical with control boards and panels in the unit control room.

The following technologies of the reactor building will be operational on full-scale simulator of nuclear power plant Temelín:

- start-up from zero to nominal power,
- unit operation at different power,
- unit shutdown from nominal power,
- mitigation of failure conditions,
- mitigation of accident conditions,
- training for non-standard equipment tests before the actual tests,
- basic standard tests of technology controlled from the unit control rooms.

Full-scale simulator will also serve for the verification of selected operating procedures, selected tests and physical and energetic startup procedures. Similarly, it will be used as a supporting analytical tool for technology updating.

System of future training on full-scale simulator of nuclear power plant Temelín is based on the experience gained with VVER-440 simulator, and takes into account recommendations of the IAEA [6-10]. The Simulator as a technical tool will fulfil requirements established by ANSI/ANS standard [6-11].

Evaluation of training

Evaluation of training and verification of personnel capability is precondition for establishing efficiency and effectiveness of training programmes applied within individual forms, stages and types of training. Results of evaluation serve as a basis for feed-back which helps to modify contents and scope of the professional training to improve its effectiveness. Basic information sources used for a systematic evaluation of professional training are as follows:

- direct verification of personnel knowledge,
- indirect verification of personnel capability,
- evaluation of training processes by the senior personnel, training-leavers, lecturers, evaluation of training programmes, etc.

6.2 Statement on implementation of the obligation concerning Article 11

Provision of financial and human resources for nuclear safety assurance in the Czech Republic is in accordance with requirements established in Article 11 of the Convention.

7. Human factors - Article 12 of the Convention

Each Contracting Party shall take the appropriate steps to ensure that the capabilities and limitations of human performance are taken into account throughout the life of a nuclear installations.

7.1. Description of the current situation

7.1.1 Methods for prevention, determination and correction of human errors

Legislative requirements

Act No. 18/1997 Coll., on Peaceful Utilisation of Nuclear Energy and Ionising Radiation (the Atomic Act) in its Article 17, para 1, letter b) establishes as one of the general obligations of a licensee, obligation to:

"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"

This requirement of the Atomic Act is elaborated in Regulation No. 106/1998 Coll. which, in its Article 14, imposes upon the licensees obligation to re-evaluate and modify the operating procedures so that they are conform to current level of science and technology, and at the same time reflect the operation experience and practice. Assessment of human factor impacts is one of the basic parts of such process.

Assessment of human factor effects at nuclear power plant Dukovany

Human error is one of the issues which are at nuclear power plant Dukovany intermittently followed with a great attention. Results of regular assessment of operational events show that a majority of these events has been caused by one or other form of human error, either direct operator error or error connected with fault in other areas (documentation, design, etc.).

For the investigation of human error causes, nuclear power plant Dukovany applies ASSET methodology developed and used by the IAEA. Direct causes of the individual events are classified among equipment failures, documentation deficiency or human error. In the case that some of the event was caused by a human error, this event is further investigated and results of investigation are recorded in so called "Human Factor Form".

A greatest effort is spent on monitoring human factor in the capacity of shift operating personnel. Analysis of human errors over the last five years helped to establish criteria which show whether the number of shift personnel errors has increased or decreased.

Causes of human errors are, after further investigation, verified by the Failure Commission of nuclear power plant Dukovany. A detailed analysis of personnel errors with violation of one of the established criteria is then carried out by the Operations Division.

Human factor in other sections/divisions of the power plant (maintenance, preparation for operation, etc.) is monitored by the Events Investigation Unit. The share of individual divisions and departments in the failures, caused by their personnel, is monitored and regularly quarterly evaluated.

Likewise is evaluated the share of human errors in the events significant for safety, in the events with loss of production, in the events during unit major overhaul, during refuelling, etc.

Recording and investigation of events which may have occurred (but did not occur) has been introduces recently. The plant is aware that the causes of those ”near miss” events are the same as the causes of usual operational events. Thus, establishing of causes and introducing remedial measures make up for an efficient prevention of such events.

Human errors are remedied by implementing the appropriate corrective measures. The Failure Commission regularly checks on the implementation of such corrective measures.

Training days, regularly organised for all workers, help to improve quality of work of all Dukovany personnel. Information on the operational events, selected in accordance with the trained personnel specialisation, is presented within those training days, however especially with regard to human error cases.

Obligatory psychological examination of selected professions helps to single out such workers with whom failures following from inconsistency or negligence should be minimised.

Over several years, the plant systematically creates a new system of operating procedures which are designed in such a manner that an operator is led, warned about danger, and where description of the manipulation is fully unequivocal. Selected manipulations are increasingly described in the check-list form.

7.1.2 Role of the Regulatory Body in the human factor assessment

The SÚJB systematically monitors the impact of human factor on the operational safety, within its regular meetings with the Operator on the results of so called ”Failure Commission” (for more details see Chapter 14.1.6 of this National Report). Each month, the SÚJB prepares a report on the results of those meetings, the reports are then evaluated from the viewpoint of feasible corrective measures initiated by the Regulatory Body.

System of verification of special professional capability applied for nuclear installations selected personnel, is instrumental in the prevention of human error occurrence in selected personnel work. In accordance with the Atomic Act (chapter 3.1.3 of this National Report) the SÚJB assigns for this purpose the State and Expert Examination Commissions, and determines activities which have a direct impact on nuclear safety and activities especially important for nuclear safety and radiation protection.

Such verification is carried out as an examination before the State Examination Commission, examination itself is composed of theoretical written and oral part, and practical part. The State Examination Commission may decide to waive the practical part in the case of renewing a license for the performance of the same activity. If applicant fails the examination, he may

repeat it within 1 - 6 month period, the State Examination Commission sets the date of examination. Individual who succeeds in examination by the State Examination Commission is, in accordance with the implementing regulation, granted the SÚJB selected personnel license for the period varying from 2 to 4 years.

7.2 Statement on implementation of the obligation concerning Article 12

Requirements of the Convention on evaluation of possible human factor impact on operational safety over the whole service life of nuclear installations following from Article 12, are in the Czech Republic fulfilled.

8. Quality Assurance - Article 13 of the Convention

Each Contracting Party shall take the appropriate steps to ensure that quality assurance programmes are established and implemented with a view to providing confidence that specified requirements for all activities important to nuclear safety are satisfied throughout the life of a nuclear installation.

8.1 Description of the current situation

8.1.1 National legislation for the area of Quality Assurance

History of the legislation

As early as in 1979, the former ČSKAE issued Decree No. 5/1979 Coll., on Quality Assurance of Selected Equipment of Nuclear Installations from the Viewpoint of Nuclear Safety (see chapter 2.1.1 of this National Report). This decree established for the first time requirements for the development, approval, implementation and control of quality assurance programmes and for related to them activities during planning, preparation, designing, manufacturing, commissioning and operation of nuclear facilities - from the aspect of nuclear safety. Decree No. 5/1979 Coll. established rules for the equipment classification in the nuclear power industry with regard to nuclear safety. Requirements of Decree No. 5/1979 Coll. were since implemented during construction of nuclear power plant Dukovany.

Subsequently, Act No. 28/1984 Coll., on State Supervision of Nuclear Safety of Nuclear Facilities established obligation of the organisation responsible for construction and/or operation of nuclear installations to submit the quality assurance programmes for the Regulatory approval, and generally fixed the State supervision over their implementation.

In 1990 the original Decree No. 5/1979 Coll. has been revised. New Regulation of ČSKAE No. 436/1990 Coll., on Quality Assurance of Selected Equipment from Viewpoint of Nuclear Safety of Nuclear Installations, following the same concept as the original regulation made the quality assurance requirements conform to the valid at the time legislation. Quality system during design, manufacturing and construction of nuclear power plant Temelín was fully adapted to the requirements of the new regulation. Likewise, the quality system for operation of nuclear power plant Dukovany was revised to achieve compliance with those requirements.

Current legislative

Act No. 18/1997 Coll., on peaceful utilisation of nuclear energy and ionising radiation (the Atomic Act) amends general conditions for the performance of practices related to utilisation of nuclear energy, radiation practices. Article 4, para 7 sets forth that:

“ Any person performing or providing for practices related to nuclear energy utilisation or radiation practices, except practices as in Article 2 a), item 6), must have an 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, including tangible or intangible products, processes or organisational arrangements, with respect to the

importance of this item from the aspect of nuclear safety and radiation protection. The implementing regulation shall set basic requirements for quality assurance of classified equipment with respect to their safety classification "

The relevant implementing regulation is Regulation No. 214/1997 Coll., which establishes basic requirements to quality assurance of selected equipment (items) and on their safety classification, and gives details of:

- requirements for the quality system implementation,
- requirements to such quality system,
- requirements to quality assurance of selected equipment (items) with respect to their safety class,
- requirements to the contents of quality assurance programmes,
- criteria for assigning items to safety classes,
- scope and format of the List of Selected Items.

In accordance with Article 13, para 5 of the Atomic Act, an approval issued by the SÚJB of a quality assurance programme for the licensed practice is a prerequisite for the issue of a license for utilisation of nuclear energy and ionising radiation (see chapter 3.2.1 of this National Report).

8.1.2 ČEZ, a.s. strategy of Quality Assurance

General meeting of the ČEZ, a.s., shareholders has approved concept of the business activity which is derived from the analysis of external and internal business environment, and establishes both the subject of business and strategic initiatives of the company which must be fulfilled to maintain the ČEZ, a.s., mission and to achieve the business targets.

The Company's Quality Assurance Concept, one of the tools instrumental in achieving the business targets and maintaining the company mission [8-1], has been published as a decision of the Board of Directors on December 21, 1995, it enumerates the company quality assurance related activities as follows:

- to create conditions for satisfaction of customers, shareholders and employees,
- to document the quality assurance system and to use it as a system instrument within the company,
- to create conditions for quality system of all processes and their unceasing improvement,
- to assure mutual and effective co-operation of all organisational units of the company,
- to achieve a high quality standard by increasing competence and motivation of all employees in the environment of the corresponding culture,
- to assure co-ordinated responsible approach to the environment,
- to assure controlled selection and evaluation of suppliers.

In 1997, the quality concept was extended to include an obligation of the Board of Directors to improve systematically the ČEZ, a.s., profile as a company which consistently fulfils its obligations toward the environment. managers on all levels are responsible for realisation of quality concept. All employees fulfil their duties in accordance with the quality system with permanent effort to improve all processes by implementing quality system.

One of the most significant tools for achieving the company's goal is application of quality system. In 1995, the Board of Directors, besides the quality concept, has decided on the time schedule of its implementation. The ČEZ Quality System is a comprehensive set of principles and requirements representing quality related philosophy of the company. Quality system comprises methods and tools for the quality control, it is developed in accordance with the Czech Republic regulations and takes into account the requirements included into ISO 9000 and 14000 standards, as well as recommendation of the IAEA. The implemented quality system permits to fulfil requirements of both the internal and external environment.

Created quality system has all features of a complex quality controlling tool and is aimed at three basic spheres:

- customers - to fulfil their requirements and expectations,
- internal need of the company - to provide efficient management instruments, including those for evaluation of potential risks and benefits of the business, and mitigation of the environmental impacts, etc.,
- suppliers - to build a base of the competent suppliers.

For this purpose the company provides the appropriate human, material, financial and information resources.

8.1.3 Quality Assurance programmes at all stages of nuclear installations service life

In July 1995, the ČEZ, a.s., set out the Safety Strategy for nuclear activities (see chapter 5.1.2 of this National Report). This strategy incorporates safety obligation of the ČEZ management for the area of utilisation of nuclear energy, and defines company's safety goals.

All company documents are conform to its strategy for the area in question.

The Top Quality Assurance Programme (TQAP) is the main document of the company quality system with universal validity. This document, approved by the company management in January 1996, has been revised with respect to requirements of the internal and external environments, changes in the ČEZ, a.s., system of management and development of the quality system itself. The objective of the TQAP is to establish general principles for management of individual processes and for development of hierarchically arranged controlling documents, divided in the Quality Assurance Programmes, Rules, control and quality assurance procedures and follow-up documentation. Quality Requirements established in the TQAP are binding, and their application is in compliance with the importance of a process, item or service.

Aspects of nuclear safety, radiation protection, emergency preparedness and physical protection are described in the document "Safety Rules for the Area of ČEZ, a.s., nuclear activities" (see chapter 5.1.2 of this National Report). These rules are binding for all personnel employed in nuclear area, they define authorities and responsibilities with respect to the interface between the company Headquarters and its individual organisational units.

As to the Atomic Act requirements, the ČEZ, a.s., has an approved Quality Assurance Programme for the Area of Nuclear Activities. Both nuclear power plants, Dukovany and Temelín have developed their own quality assurance programmes for individual stages of each plant's service life [8-2] [8-3].

8.1.4 Application and evaluation of quality assurance programmes efficiency

The ČEZ, a.s., has established responsibilities for the quality control and verification for all processes, and on all levels. Responsibilities with respect to equipment quality and processes verification are described in the relevant documents which are an integral part of the documented quality system. Quality Assurance Section is responsible for development and co-ordination of the quality system implementation within the company as a whole, as well as for evaluation of the quality system's effectiveness. Responsibilities for the actual implementation bear all company managers. Each employee is responsible for quality of his/her "nuclear" work. Individuals who perform control and verifications have adequate authority to identify discrepancies and, if necessary, to require that remedial measures are taken. Required quality is verified by the employees who do not perform control and verification activities. All company employees are encouraged to submit proposals on upgrading and modifications of the quality system.

Regular quality oriented training of company employees is understood as an investment into quality. Employees on levels of management are trained in accordance with the unified training programme. Training programme for the management and other employees, focused on quality, is based on the ČEZ, a.s. quality concept. Objective of the training programme is to achieve that all company employees will become engaged in the quality assurance and enhancement process, and thus participate in the development, implementation and improvement of quality system.

At the end of each calendar year, effectiveness of the quality system is assessed and the system is subsequently updated. Managers on the all levels of management periodically evaluate all processes and procedures (subjects of their authority) with the objective to review their actual condition and efficiency. Quality systems of nuclear power plants Dukovany and Temelín are evaluated quarterly.

External audits of the quality systems at the suppliers as well as internal audits, performed by qualified auditors in accordance with the written procedures, are an important part the company control system. Company managers apply results of quality audits to take necessary corrective, preventive and remedial measures.

Final evaluation of the quality system effectiveness performs the Quality Assurance Section - for the company Executive Board, and quality department of the organisational unit - for the Directors of those units, always by the end of a year. Comparison with trends in the processes and procedures behaviour, is a part of the regular evaluation of the quality system effectiveness. Evaluation criteria are always measurable parameters which provide information on the process conditions and their output from the aspects of safety, reliability, efficiency and environmental impacts. The evaluation criteria of the quality system are measurable information on the units of quality system within a given system or procedure. Results of the quality system evaluation within the organisational units and verification of processes are described in the quarterly reports.

8.1.5 Current practice of the state regulatory body in the area of quality assurance

The SÚJB, in accordance with Article 39, checks at the licensees compliance with the Atomic Act, including the quality assurance requirements mentioned above. Whenever deemed necessary, this control activities are extended to include the subsuppliers. Control activities are focused at the system area, as well as at quality assurance of particular selected items. The SÚJB unit which performs this activity is in the first place the Components and Systems Section (see the SÚJB Organisational chart - Fig. 3-2).

Within the framework of its preventive inspection activities the SÚJB, in compliance with the Atomic Act, approves quality assurance programmes of nuclear facilities for:

- siting,
- design,
- construction, individual stages of commissioning,
- operation,
- start-up after refuelling,
- reconstruction or other changes which may have an impact on nuclear safety, radiation protection, physical protection and emergency preparedness,
- decommissioning,
- radioactive waste management,
- radioactive material management,
- training of selected personnel.

In accordance with the Atomic Act, an approved quality assurance programme is one of the conditions for the issue of a license for the activities specified in Article 9, para 1 (see Chapter 3.1.2 of this National Report). Criteria for the assessment of quality assurance programmes are established in Regulation No. 214/1997 Coll. and other binding regulations and standards.

As a separate document, the SÚJB approves the List of Selected Items which enumerates equipment selected from the aspect of their importance to safety and divided into three safety classes in accordance with the Regulation 214/1997 Coll. criteria:

- safety assurance assessment for siting,
- safety assurance method in the preparation for construction,
- safety assurance principles within the following stages.

For the site approval, as a part of the Initial (Siting) Safety Analysis Report, the SÚJB reviews:

- evaluation of quality assurance during preparation for construction,
- safety assurance method in the preparation for construction,
- safety assurance principles within the following stages.

For the approval for first fuel loading, the SÚJB, as a part of the Pre-Operational Safety Analysis Report, reviews quality evaluation of the selected items.

8.2. Statement on implementation of the obligation concerning Article 13

Current legislation of the Czech Republic and its practical application guarantee that quality assurance programmes were developed and implemented, which provides confidence that all specific requirements for all safety related activities will be fulfilled over the whole period of the service life of a nuclear installation. Requirements specified in Article 13 of the Convention are met.

9. Assessment and verification of safety - Article 14 of the Convention

Each Contracting Party shall take the appropriate steps to ensure that:

(i) comprehensive and systematic safety assessments are carried out before the construction and commissioning of a nuclear installation throughout its life. Such assessments shall be well documented, subsequently updated in the light of operation experience and significant new safety information, and reviewed under the authority of the regulatory body;

(ii) verification by analysis surveillance, testing and inspection is carried out to ensure that the physical state and the operation of a nuclear installation continue to be in accordance with its design, applicable national requirements, and operational limits and conditions.

9.1 Description of the current situation

9.1.1 Licensing process and related to it safety analyses during individual stages of a project (siting, design, construction, operation)

The legislative framework of licensing process is given by the Act No. 50/1976 Coll., on Land Planning and Construction Regulation (the Construction Act), Act No. 18/1997 Coll., on Peaceful Utilisation of Atomic Energy and Ionising Radiation (the Atomic Act) and their implementing regulations.

In the case of a nuclear installation construction, the Construction Act established three-stage procedure comprising territorial decision (site permit), construction permit and operation permit (permanent operation). Issuance of these decisions/authorisations is within competence of the corresponding local Construction Office. For more detailed information see chapter 2.1.2 of this National Report.

The Atomic Act establishes acceptable manner of the utilisation of nuclear energy and ionising radiation, as well as conditions for performance of practices related to the utilisation of nuclear energy and ionising radiation. Precondition for such practices is a SÚJB license within the administrative procedure which is separate from the described procedure required by the Construction Act. The Atomic Act explicitly forbids to launch siting, construction, operation and other activities at nuclear facilities, subject of the SÚJB licence, before the respective SÚJB licence enters into force. (For more details see chapter 3.1.2 of this National Report.)

That means that the licensing procedure, besides the three-stage process mentioned above, includes a number of other partial licenses (authorisations/permits) issued by the SÚJB in accordance with the Atomic Act during different stages of the service life of a nuclear installation.

According to provisions of Article 17, letters a) and b) of the Atomic Act, a licensee shall verify nuclear safety during all stages of the installation's service life (in the scope appropriate for the particular licences), asses it in a systematic and comprehensive manner from the aspect

of the current level of science and technology, and ensure that the assessment results are put into practice. This verification and/or assessment must be documented. The contents of these documentation are specified in the Appendices to the Atomic Act. Safety assessment is, in compliance with the Atomic Act, reviewed by the SÚJB, both analytically and within its inspection activities. Details concerning the safety related documentation preceding construction of a nuclear installation, preceding its commissioning and during its operation are described in Chapters 12, 13 and 14 of this National Report.

The implementing regulations of the Atomic Act which establish a criteria basis for the nuclear safety assessment of a nuclear installation during different stages of its service life are:

- ***Regulation No. 106/1998 Coll.,*** on Nuclear Safety and Radiation Protection Assurance in during Commissioning and Operation of Nuclear Facilities, which defines and established, especially:
  - individual stages of commissioning,
  - requirements for the scope of the commissioning programme,
  - requirements to the contents of Limits and Conditions for safe operation (Technical Specifications).
- ***Regulation No. 214/1997 Coll.,*** on Quality Assurance in Activities Related to the Utilisation of Nuclear Energy and in Radiation Practices, and Laying Down Criteria for the Assignment and Categorisation of Classified Equipment into Safety Classes,
- ***Regulation No. 215/1997 Coll.,*** on Criteria for Siting Nuclear Facilities and Very Significant Ionising Radiation Sources, and
- regulation under preparation, which will replace the original Decree No. 2/1978 Coll., on Nuclear Safety Assurance in the Process of Nuclear Power Installations Designing, Licensing and Construction.

Practical application of the requirements arising from a systematic and comprehensive assessment whether the nuclear installation is conform to its design and to safety related requirements of the valid national legislation, as well as to the Limits and Conditions, is in the following text described for nuclear power plant Dukovany, in particular for :

- systematic control of nuclear safety (supervision, inspections, tests),
- deterministic evaluation of nuclear safety (Operational Safety Analysis Report),
- probabilistic safety assessment (so called ”living” Probabilistic Safety Assessment Study).

9.1.2 Systematic monitoring and periodic assessment of nuclear safety of nuclear power installations

Systematic monitoring of the unit’s operational safety is focused in particular at the observance of Limits and Conditions of safe operation [9-1].

Observance of other requirements related to any work, including maintenance of the primary circuit equipment, is monitored during unit’s outages. The corresponding inspections are performed by the staff of Nuclear Safety Section; the work performed during units outages is checked by the managers of other centres whose personnel or whose subcontracted personnel has been involved in such work.

Information which describes the level of nuclear safety, radiation protection, fire protection and safety of work, is evaluated periodically (weekly reports on the conditions of nuclear safety, and annual reports on nuclear safety, radiation protection and reliability of nuclear power plant Dukovany operation.

Information on nuclear safety assurance is presented in both text and in graphic - as indicators which demonstrate reliability of the safety systems, conditions of certain equipment, environmental impact of Dukovany operation and observance of the principles established for the area in question (fire protection, work and health safety).

For the operational assessment of nuclear safety at nuclear power plant Dukovany serves the Risk Monitor (SAS) evaluating risk (probability of core meltdown) caused by unavailability of the unit components at the nominal configuration (power operation).

Since 1995, the unavailability is monitored at all four Dukovany units. Impact of individual components unavailability on nuclear safety is assessed using absolute value of the core meltdown probability and cumulated risk value which is a product of the increase of the core meltdown probability above the basic level and duration of the component unavailability.

Monthly reports of internal supervision of nuclear safety include graphs of the core meltdown probability for the individual Dukovany units and evaluation of the individual unavailability contribution to this risk.

Annual reports on nuclear safety and reliability of nuclear power plant Dukovany operation include assessments of the equipment unavailability - most significant contributors to the cumulated risk of Dukovany plant in the corresponding year.

SAS was also applied to analyse duration of the equipment allowable unavailability and some combinations of the unavailability defined in the Limits and Conditions for safe operation [9-1] and during selected hypothetical scenarios.

Results of such assessment - trends of the indicators for 1997 - are shown in Appendix 3 to this National Report.

Deterministic nuclear safety assessment (Operational Safety Analysis Report)

Results of nuclear safety assessment for the individual units are in compliance with the original and current legislation documented in the Safety Analysis Reports.

As a result of changes and modernisation of the Dukovany units, validity of the original Pre-operational Safety Analysis Report which provided information necessary for issuance of the permanent operation license for the Dukovany units, has been limited. Also methods of safety demonstration have been since upgraded as a result of science and technology progress; likewise, there is now a significant experience of long-term operation.

In 1991, the State Regulatory Body (the ČSKAE) in its decision No. 154 established conditions to be fulfilled by the Dukovany Operator to obtain a license for the 1st unit continued operation after 10 years. One of these conditions imposed an obligation to submit, not later than six months before the corresponding application, an innovated Safety Analysis Report which should present evidence of the unit safety proved by most advanced, state-of-the-art tools and at the same time considering the existing operational experience.

Safety evaluation in this updated, so called “Operational” Safety Analysis Report comprises a systematic deterministic analysis of feasible failures of the structures, systems and components as well as determination of the consequences of such failures. This analysis should have shown ”week points” of the design. The results were elaborated in such detail as necessary for an independent assessment of the contents, depth and conclusions of the deterministic analysis. The Safety Analysis Report submitted to the SÚJB contains such description of the plant, that is sufficient for the purpose of an independent assessment of its safety features. It contains information on the site characteristics the design must comply with, detailed information on main characteristics of the systems, especially those used for reactor control, shutdown and cooling, retention of radioactive substances, and in particular on safety systems. It describes analyses of the design accidents and presents their results.

On the basis of the Operational Safety Analysis Report, the SÚJB by its decision No. 197 in August 1995 has issued 2 year licence for the continued operation of Dukovany 1st unit. This consent was conditional on the fulfilment of 97 requirements. At present, based on review how these obligations are being kept, the SÚJB issues its license for continuous operation of Dukovany units with validity limited by results of the review after 20 years of operation.

In the following years Operational Safety Analysis Reports were prepared also for the remaining three Dukovany units.

Each Operational Safety Analysis Report is regularly updated.

Probabilistic safety assessment (”living” PSA Study)

First probabilistic safety assessment study PSA level 1 for nuclear power plant Dukovany was completed in 1993, as a result of the government sponsored programme performed by several Czech organisations under the leadership of the Nuclear Research Institute Řež. The Study has considered an internal initiating event and reactor operation at nominal power. This Level 1 Study has been since elaborated in more detail and extended as a result of a follow-up effort.

At present, in accordance with the level 1 PSA Study the value of resulting core meltdown probability for nuclear power plant Dukovany is 1.09 10^{-4} reactor/year, and it is assumed that after finalisation of all planned modernisation this value will be even better.

In 1994 the American company SAIC, while checking on this Study, has prepared its own PSA level 1 model which served as a basis of the Risk Monitor development (SAS - see above). Since 1995, the Monitor was applied for the assessment of core meltdown probability caused by unavailability of components at the individual Dukovany units.

Task of the further development of PSA level 1 model was contracted to NRI Řež, with main emphasis on the detailed evaluation of human factor. In the following years, the Study was extended to include other initiating events such as internal fires, floods and consequences of a high energy pipeline rupture. Similarly, modifications implemented at the plant, which included the design changes, equipment replacement and alternations of the operating procedures, were gradually added to the model.

The PSA level 1 results served as a starting point for reducing impacts of the most significant sequences. Thus, the design changes, replacement of some equipment and preparation of new emergency procedures followed. All planned modifications of Dukovany units related to nuclear safety are being evaluated from the aspect of the PSA results, and consequently the priorities of those modifications are being established. The PSA level 1 results have been also used in the preparation of a new emergency Procedure.

First results of the PSA level 2 which establishes probability of the radioactivity release into the environment during postulated events, were made available in April 1998. This Study was prepared within an American grant (provided to the SÚJB) by the SAIC in co-operation with NRI Řež, and was based on the PSA level 1 developed in 1994. For VVER type reactors this project of a level 2 Study was a pilot one, the level 2 study will continue, nevertheless it has already provided very valuable information.

So called ”living” PSA level 1 Study is a permanent programme, the work covers two main areas:

- updating of the Study, i.e. modelling of the implemented modifications, updating of the specific units data and incorporation of more accurate analyses, etc.,
- extending scope of the study.

9.1.3 Preventive maintenance, in-service control of main components, evaluation of ageing

Nuclear power plant Dukovany has implemented three basic programmes with the objective to monitor and to maintain the level of nuclear safety:

- preventive maintenance programme,
- in-service control programmes,
- programme which monitors ageing of the main components.

Preventive maintenance programme

Maintenance is carried out in accordance with the maintenance programme for individual equipment, and its methods and scope depend on the equipment category.

Basic maintenance methods applied at Dukovany plant are:

- Preventive maintenance which is further divided into:
  - periodic preventive maintenance,
  - predictive maintenance,
- Corrective maintenance.

Preventive maintenance is carried out in the prescribed cycles, i.e. repeating time intervals which depend on time or number of hours in operation. Its scope varies in dependence on the maintenance type, i.e. if it is a routine repair, medium-range repair or major overhaul. Results of inspections, monitoring, nuclear safety and reliability assessments as well as results of the operational diagnostics serve to evaluate and to optimise the maintenance programme for each given equipment.

The maintenance scope and financing are at nuclear power plant Dukovany planned in the whole range from 5 years maintenance plans up to daily maintenance. A special information system is applied for the purpose of the actual management of maintenance.

Preventive maintenance (as well as repairs) is realised on the contractual basis by qualified companies, mostly manufacturers of the equipment (VÍTKOVICE, ŠKODA Plzeň, SIGMA), and by the companies transformed from the former Dukovany own maintenance section. All those activities are carried out in accordance with established procedures, and under supervision.

In-service inspections

In-service inspections are carried out in accordance with the approved by the SÚJB inspection plan for the safety related components, as have been selected by the plant Architect Designer. This selection has to be approved by the SÚJB. The inspection programmes for individual equipment were proposed by the equipment manufacturers and are included into the so called ”Individual” Quality Assurance Programmes for each component.

Applied are the following methods: visual, capillary, magnetic powder, eddy currents, ultrasonic, permeating radiation, thickness measurement by ultrasonic device, dimensional, tightness and pressure tests, diagnostic measurements. The range and number of the methods depend on the particular component’s importance.

Inspections performed by mechanised methods are, as a rule, contracted with external suppliers, usually - equipment manufactures (ŠKODA Plzeň, VÍTKOVICE Ostrava) or with specialised companies (VÚJE Trnava, TEDIKO Chomutov). Non-automated inspections are performed by the plant own personnel.

Results of inspections are reviewed by the group of professionals composed of representatives from regulatory bodies (SÚJB, ČÚBP, ITI,...), equipment manufacturers and internal plant supervision before an unit is put into operation.

Components life monitoring programme

Components life monitoring programme is directed at the main plant components important for nuclear safety.

Residual service life is monitored in the reactor pressure vessel including its internals, for steam generator, main circulation pumps and pressuriser, residual service life is also monitored for the main circulation pipeline. Input data in the service life monitoring system are the measured technological values (especially - temperature, pressure and radiation dose rate), as well as information obtained as a result of non-destructive in-service examinations, chemical data which characterise corrosion environment, material and physical properties.

At the secondary circuit, the similar programme is focused at the erosion-corrosion of the piping systems.

9.1.4 Regulatory practice

The Atomic Act charges the SÚJB with a duty and at the same time gives it an authority to verify and to assess nuclear safety (see chapter 9.1.1). The SÚJB performs its function within the framework of:

- inspection activities - to establish compliance with the Atomic Act and its implementing regulations,
- so called ”licensing” procedures (issuing licences for particular practices),
- approvals of the documentation (defined in the Atomic Act).

Verification of the safety conditions by the SÚJB is based especially on its inspection activity. Article 39 the Atomic Act establishes the SÚJB (its inspectors) authority to carry out inspections. Article 40 establishes the authority of inspectors to require that the remedial measures are taken by a certain deadline, to charge the inspected person to perform technical inspections, reviews or testing, and to propose the imposition of a penalty. Again according to Article 40, the SÚJB is authorised, in the event of hazard arising from delay or an occurrence of undesirable situation with the impact on nuclear safety, to issue a provisional measure imposing the obligation to reduce the power output or even to suspend operation of the nuclear installation. For details - see chapter 3.1.2 of this National Report.

Inspection activity of the SÚJB is carried out as three different types:

- routine inspections,
- planned specialised inspections,
- inspections as a response to a certain situation (so called ”ad-hoc” inspections).

Routine inspections are planned so as to cover all regular important activities of the licensee, especially with respect to the observance of Limits and Conditions. This plan is prepared taking into account the plan of operation, requirements of Limits and Conditions, and requirements of operating procedures; it is carried out in daily, weekly and quarterly intervals. Results of the routine inspection activity are usually evaluated once a month. The activity itself is documented in monthly records which are reviewed by the licensee. The main routine

inspections performers are the resident inspectors at nuclear installations for whom those inspections are subject of their work.

In the case of the planned specialised inspections, the regular semi-annual plan is drafted on the basis of:

- evaluated results of the inspections performed during previous period,
- plan of the nuclear installation operation,
- evaluation and conclusions of routine inspections,
- conclusions of the SÚJB evaluating effort,
- independent analyses and results and findings of the safety analyses.

These inspections are usually carried out by a team, composed of resident inspectors and inspectors from the Central (Prague) Office.

So called ”ad-hoc” inspections are performed to examine events and failures with impact on nuclear safety, as well as to clarify serious findings of the routine or planned inspections.

The SÚJB assesses nuclear safety also in the course of so called ”licensing” procedures for the issue of licenses for practices identified in the Atomic Act. Besides that, in the case of nuclear power plant Dukovany, the SÚJB assesses its level of nuclear safety within the framework of:

- assessment of the periodically submitted Operational Safety Analysis Report (submitting of this Report is one of the license preconditions),
- evaluation of the in-service inspections programme,
- evaluation of the programme for the enhancement of nuclear installations safety ,
- evaluation of the operational experience implementation and implementation of the latest achievements of science and technology.

All results obtained by the SÚJB in the area of nuclear safety verification and assessment are, in compliance with the Atomic Act, regularly annually submitted to the government. Information receives also the general public.

9.2 Statement on implementation of the obligation concerning Article 14

In accordance with the Convention Article 14, a Czech licensee performs a comprehensive and systematic safety evaluations before the nuclear installation is constructed, before its commissioning and in the course of its entire service life. The evaluations are documented, and when necessary, updated with respect to the operational experience, and significant new scientific and technological information related to nuclear safety, it is in compliance with the Act, reviewed and analysed by the responsible Regulatory Body.

10. Radiation protection - Article 15 of the Convention

Each Contracting Party shall take the appropriate steps to ensure that in all operational states the radiation exposure to the workers and the public caused by a nuclear installation shall be kept as low as reasonable achievable and that no individual shall be exposed to radiation doses which exceed prescribed national dose limits.

10.1 Description of the current situation

10.1.1 Summary of legislation related to radiation protection

Radiation protection in the Czech nuclear installations is regulated by Act No. 18/1997 Coll., on peaceful utilisation of nuclear energy and ionising radiation (the Atomic Act) and its implementing Regulation No. 184/1997 Cool., Requirements for Radiation Protection Assurance.

New legislation in the radiation protection area is consistently issued from the internationally adopted radiation protection principles based on the recommendations of renown international non-governmental bodies, and especially on the recommendation of the International Commission on Radiological Protection No. 60 (1990) as well as on the linked-up international basic standards of radiation protection accepted by the non-governmental organisations, including International Atomic Energy Agency. Preparation of these legal regulations was also guided by the request for harmonising the Czech Republic legislation with the corresponding directives of the European Union, especially with the European Commission Directive 96/29 Euratom of May 13, 1996.

The Atomic Act established the system for protecting the public and the environment against adverse effects of ionising radiation. General obligations for the performance of practices related to nuclear energy utilisation and radiation practices are established in Article 4 of the Act. The first and foremost is the general obligation:

" Anybody, who utilises nuclear energy or provides practices leading to exposure or provides interventions to reduce exposure from natural sources or exposure resulting from radiation incident, shall justify his activities by their benefit, which shall offset any possible existing or potential risks ... " (So called justification principle)

" Anybody, who utilises nuclear energy or provides practices leading to exposure or provides interventions to reduce exposure from natural sources or exposure resulting from radiation incident, shall maintain such level of nuclear safety, radiation protection, physical protection or emergency preparedness, that risks to life and health of people and to the environment are as low as reasonably achievable, taking into account social and economical factors ..." (So called ALARA principle)

" *Anybody, performing practices resulting in exposure, is required to retrench exposure of persons so that the total sum of exposure caused by a possible combination of exposures from practices resulting in exposure, does not exceed determined limits. The Office determines the exposure limits in the implementing regulation. The Office has the authority to include into the licence a determination of boundary values, in order to ensure that limits are not exceeded*

even if exposure from other practices, resulting in exposure, are included ... " (So called dose limitation principle)

"*Exposure of persons participating in interventions in case of radiation incident must not exceed limits determined for exposure of source contact personnel multiplied by ten, with an exception of a human lives rescue or preventing a development of a radiation incident, potentially causing massive both economic and social consequences. Those persons must be evidently acquainted with the risks related to such interventions ... "*

The Atomic Act established obligation to obtain the SÚJB licence for practices enumerated in Article 9 (siting, construction, particular stages of the installation commissioning, etc.). The same applies for the discharge of radionuclides into the environment and the radioactive waste management. Articles 17 - 19 establish that such licensees have also a number of additional obligations. As related to radiation protection of nuclear facilities, those obligations are:

- ensure radiation protection in the scope appropriate to the particular licences and ensure systematic control over the observance of radiation protection requirements,
- comply with the conditions of the licence issued by the Office, proceed in accordance with approved documentation and investigate, without delay, any violation of such conditions or procedures and take remedial measures to prevent repetition of such situations, including obligation to notify, without delay, the State Office for Nuclear Safety on all cases when one of the exposure limits has been exceeded,
- comply with technical and organisational conditions for safe operation of nuclear installations laid out in the implementing regulations,
- participate in the functioning of the National Radiation Monitoring Network to the extent established in government ordinance,
- report to the State Office for Nuclear Safety, without delay, any change or event affecting nuclear safety, as well as any change in circumstances on which issuance of the license has been based,
- provide the public with information on nuclear safety and radiation protection assurance which is not subject to State, professional or commercial secret,
- monitor, measure, evaluate, verify and record all values, parameters and facts important for radiation protection in the extent as laid down in implementing regulations, including radiation monitoring of individuals, workplace and its vicinity, keep and archive records on these facts and submit the recorded information to the State Office for Nuclear Safety in the manner set out in an implementing regulation,
- keep production of radioactive waste and spent nuclear fuel to the minimum necessary level,
- prepare and hand over to the Radioactive Waste Repositories Authority data on short-term and long-term production of radioactive waste, spent nuclear fuel, and other information necessary to determine the amount and method of transfer of payments to the nuclear account,
- keep records of radioactive waste by type of waste in such a manner that all characteristics affecting its safe management are apparent,
- ensure health examinations for personnel who handle ionising radiation sources,
- provide a system of training, verification of competence and special professional competence of personnel in accordance with the importance of the work they perform.

In the event of a radiation accident, the licensee is obliged to the extent and in the manner determined by the on-site emergency plan approved by the State office for Nuclear Safety to:

- notify without delay the relevant District Authority, the State Office for Nuclear Safety and other relevant bodies specified in the on-site emergency plan, on the occurrence or suspected occurrence of a radiation emergency,
- in the event of a radiation emergency, ensure that a warning is issued, without delay, to the public within the emergency planning zone,
- ensure that the consequences of the radiation accident are dealt with, without delay, in premises where the licensee performs his activities, and take steps to protect employees and other persons from the effects of ionising radiation,
- ensure monitoring of exposures of the employees and other persons and prevent any release of radionuclides or ionising radiation into the environment,
- inform relevant regulatory bodies of monitoring results, factual and anticipated development of the situation, intervention taken to protect employees and the public, and measures taken to mitigate the radiation accident, and also of factual and anticipated exposure of people,
- control and regulate exposure of employees and persons participating in the radiation accident mitigation within the premises where he performs his activities,
- co-operate in dealing with the consequences of the radiation accident that occurred at his facility,
- in the event of a radiation emergency, participate in the activities of the National Radiation Monitoring Network.

Licensee is also obliged to submit to the appropriate District Authority background documents to prepare the off-site emergency plan and to co-operate with it to ensure emergency preparedness of the emergency planing zone, to the extent established in a government ordinance concerning the emergency planning zone, and participate, at his own cost, in providing for activities of the National Radiation Monitoring Network, providing the public in the emergency planning zone of relevant installations or workplaces with antidotes, running a press and information campaign aimed at ensuring that the public is prepared for radiation emergencies, providing a system for notification of relevant bodies and participate in radiation accident clean-up operations within the emergency planning zone.

Likewise, the Atomic Act establishes rights and obligation related to the radioactive waste management. According to the degree of contamination, the legislation distinguishes three basic categories of radioactive waste. First category - wastes contaminated in such a low degree that their radioactivity can be disregarded. Second category - wastes contaminated to a higher degree but so that they may be discharged into the environment after the relevant administrative procedure, and on the grounds of the specific permit of the State Office for Nuclear safety, and in the manner and under conditions specified in such permit. Third category - wastes which are contaminated by radionuclides to a such degree that requires their long-term isolation from the environment and so they must be disposed at the radioactive waste repository. Radioactive waste disposal is by law entrusted to the Radioactive Waste Repositories Authority.

The basic regulation implementing the Atomic Act in the radiation protection area is Regulation No. 184/1997 Coll., on Requirements to Radiation Protection Assurance. This regulation provides details of the manner and extent of the protection of individuals and the environment against adverse effects of ionising radiation during practices which may lead to

exposure as well as during preparation for and actual performance of intervention to reduce current exposure, and thus - serves to regulate a major part of authorisations established in the Atomic Act related to radiation protection.

Regulation No. 184/1997 Coll., besides other, quantifies which materials and objects are considered radionuclide sources (§ 4), i.e. when goods and objects are subject to regulation, and on the other hand - when they may be excepted from the regulation (§ 5). It specifies classification criteria for the ionising radiation sources division into insignificant, minor, significant and very significant (§ 6). Regulation also establishes details of the procedures and criteria to optimise radiation protection (§ 7), it introduces the limiting values of exposure (§ 8 - § 13).

10.1.2 Implementation of radiation protection requirements

Dose limits

New regulations issued in 1997 made the dose limits values conform to the European Commission Directive 96/29/Euratom.

Very frequently used the whole body exposure limits are now expressed as internationally recommended values which express an effect of the exposure on the whole human organism (effective dose). They represent a sum of the effective doses from external exposure and the relevant committed doses in a specified period. New regulations, unlike the previous ones, do not establish either the limits for periods shorter than one year or limits related to periods longer that five consecutive calendar years.

Numerical values of the limits for individual members of the public, i.e. persons who are usually exposed involuntary and unconsciously, are lower than for persons who are aware of the possible risks and are exposed voluntary and intentionally, either while executing their professional duties or while preparing for such profession.

The basic effective limit of dose for occupational exposure of the personnel who handle ionising radiation sources of A and B categories, i.e. persons older than 18 years of age, in contact with ionising radiation consciously and voluntary and who demonstrable have received information on possible occupational exposure and on the related risks, are 100 mSv for the period of five consecutive calendar years, under the condition that in each one calendar year this value must not exceed 50 mSv. What more, it is required that there must be a routine monitoring of the individual doses for personnel of category A to which, besides others, belong all persons who work in the controlled areas of nuclear installations, and that the records of those individual doses are kept for a minimum of 50 years. Established were also the derived limits expressed as directly measurable values, to simplify control of the personnel in A and B categories.

The basic effective dose for the individuals between 15 and 18 years of age who come into contact with ionising radiation sources consciously and voluntary who demonstrable have received information on possible occupational exposure and related to it risks in the course of the special training for future profession, are 6 mSv in a single calendar year.

Basic general effective dose limit, i.e. limit applicable to all remaining members of the public, is 1 mSv in a calendar year, or under the conditions specified for the operation of workplace with significant or very significant ionising radiation sources and as an exception - 5 mSv over 5 consecutive calendar years.

Basic general limits for the population in the vicinity of a workplace with ionising radiation sources are derived for the average calculated exposure within the most exposed population group, for all expected exposure paths. If there is no direct information for such calculations, applies a conservative estimate of factors which have an effect on the spread of radioactivity and exposure of individuals in the vicinity of an installation for which the State Office for Nuclear Safety has the authority to impose the dose constraints (limiting values) related to the exposure caused by this installation only, and which serve as upper bound values for optimising radiation protection of the nearby population.

Conditions for radioactive discharges

Discharge of liquid and gaseous radioactive substances from nuclear installations into the environment is regulated by the Atomic Act (Article 9, para 1, letter h)) and the particulars, including criteria, necessary for the corresponding licence established § 32 of Regulation 184/1997 Coll. This article sets forth that the controlled discharge of radionuclides into the atmosphere or water may be allowed only under the condition that the annual effective dose in the most critical group of population caused by such discharges will not exceed 250 microSievert. For discharges, besides this source related upper bound, applies also the general limit 1 mSv based on the emission principle which is however valid for the individual annual dose from all sources. Each discharge must be justified and optimised. Therefore, the authorised limits of gaseous discharges from individual nuclear power plants are such that they would lead to annual effective doses lower by an order of magnitude.

Permit for discharge of radionuclides into the environment is issued by the SÚJB. Liquid discharges are, however, included into ”broader” authorisation which is issued by the relevant local management of water supplies in agreement with the SÚJB (in the matter of water radioactivity). Similarly, authorisation for gaseous discharges is issued by local office of Czech Inspection of the Environment.

The derived activity limits for discharges are not regulated by any legal document, they are established in the corresponding permits, specifically for each individual installation. Therefore, nuclear power plant Temelín has obtained only a decision on the discharges into water.

All discharges are monitored by an extensive monitoring system which includes monitoring by nuclear installation Operators (under the SÚJB supervision) as well as an independent measurements performed directly by the SÚJB or for it - by the Radiation Protection Institute. The results of measurements provide a reliable proof that the allowed activity of discharges has not been exceeded, and that the calculated effective dose of population due to discharges in the vicinity of nuclear installations has been not higher than tens of micro-Sieverts per year.

Optimisation in radiation protection

Technical and organisational requirements, limits and approaches used for the justification of the reasonably achievable protection against ionising radiation are established in § 7 of Regulation No. 184/1997 Coll. The fulfilment of these requirements is checked within the licensing process of a particular practice and in the course of regular inspections. That means that for nuclear installations:

- feasible alternatives of the radiation protection and costs of the corresponding protection measures have to be assessed and compared before commencement of each practice/activity, as well as the collective doses and doses in the relevant critical groups, applying as a rule, procedure described in para 4 of the mentioned article,
- during operation - regular (annual) analysis of the exposures related to the particular practice, and possible additional interventions to assure radiation protection and to compare with similar practices.

Reasonably achievable level of radiation protection can be proven by a procedure which compares costs of the alternative protection measures for the enhancement of radiation protection (for instance - construction of additional barriers) with financial benefits expected from the correspondingly reduced exposure. The reasonably achievable level of radiation protection is considered proven, and no additional protection measures are needed, if costs are higher than the benefits. Regulation No. 184/1997 Coll. establishes values of monetary equivalents for the reduction of collective effective doses of exposed personnel or population, scaled in dependence on the expected collective effective dose and limiting exposures. The Regulation also takes into account the possible need to valorise those financial sums.

Radiation monitoring in the vicinity of nuclear installations

Operator of a nuclear installation is legally responsible for radiation monitoring in the vicinity of his installation. Monitoring must be carried out in accordance with the monitoring programme approved by the SÚJB. Such monitoring programme establishes the range, frequency and methods of measurements and evaluation, as well as the corresponding reference levels. Monitoring at nuclear installations is at present performed, as a rule, directly by specialised departments of the Operator. The SÚJB controls fulfilment of the monitoring programme and also takes its independent measurements.

External dose rate in the Dukovany vicinity is continuously monitored by the teledosimetric system operated by this nuclear power plant. Nearby each power plant there is at least point of National Independent Early Warning Network (see later). Monitoring of the equivalent dose due to external exposure nearby nuclear power plants is ensured by local thermoluminiscent detectors networks operated by the radiation monitoring laboratory of each nuclear power plant. Independent on these networks, the Regional Centres of the State Office for Nuclear Safety perform their own measurements also using thermoluminiscent detectors. Until now, none of these networks has registered violation of the inquiry level caused by operation of the nuclear power plant.

Regular sampling and measurements of the radionuclides activity in components of the environment near nuclear power plant Dukovany (operating) is carried out by both the radiation monitoring laboratory and the SÚJB Regional Centre in Brno.

There is no legal regulation which requires that nuclear Operator must issue reports on the monitoring results of discharges, however, since all nuclear installations are parts of the National Monitoring network, it is ensured that Regulatory bodies indeed receive regular reviews of the results of measurements. The Operator, of his own free will, publishes various information materials for the public. This area will be regulated by the Government ordinance under preparation on the emergency planning zone (see Chapter 2.1.2 of this National Report).

A number of other measurements are taken in the nuclear power plants vicinity with the objective to detect and assess any release of radioactive substances and to provide credible background information necessary to take decisions on the intervention measures for the public protection. Those are measurements within the framework of National Radiation Network co-ordinated by the SÚJB, which in co-operation with the Radiation Protection Institute, acts as a head office of this Network. Results of monitoring are submitted to the Governmental Commission for Radiation Emergencies and to the public (through District Authorities, sanitary stations and libraries) in the Annual reports on radiation situation within the Czech Republic territory.

Radiation Monitoring Network operates in two modes: the “normal” mode which is focused at the monitoring of the actual radiation situation and at early detection of a radiation accident, and the so called ”emergency” mode aimed at the assessment of the consequences of such accident. The normal mode is carried out continuously by so called ”permanent components” of the Radiation monitoring network. The emergency mode includes also its “emergency components”. Monitoring in normal conditions is carried out by several subsystems, in which participate either selected or all permanent components of the Radiation Monitoring Network. These subsystem can be divided into six groups:

- ***early detection network,*** which is composed of 37 continually working measuring points with automatic data transmission of the measured values to the central database. 27 measuring points are operated by the Czech Institute for Hydrometeorology, 8 points by the SÚJB Regional Centres, the State Radiation Protection Institute, and Institute for Expertises and Extraordinary Situations at Příbram each operate one.
- ***territorial TLD network*** of 206 measuring points with thermoluminiscent dosimeters. This Network is operated by the Regional Centres in co-operation with the State Radiation Protection Institute, Institute for Expertises and Extraordinary Situations also participates (partially),
- ***local TLD networks*** with 78 measuring points equipped with thermoluminiscent detectors - in the vicinity of nuclear power plant Dukovany and nuclear power plant Temelín, operated by these power plants and Regional Centre Brno,
- ***territorial network for air contamination measurements*** which includes 12 measuring points of air contamination equipped with large-scale sampling equipment for taking aerosol and precipitation samples, operated by the State Radiation Protection Institute, the SÚJB Regional Centres and radiation monitoring laboratories,
- ***network of laboratories*** (6 laboratories of the SÚJB Regional Centres, 2 radiation monitoring laboratories and the laboratory of the State Radiation Protection Institute) equipped to carry out the gamma-spectroscopic and radiochemical analyses of the radionuclides content in the environment samples (aerosols, precipitations, food, drinking water, fodder, etc.),
- ***network operated by the Army of the Czech Republic*** (23 stabile measuring points from which 13 are in trial operation).

The monitoring programme within the Radiation Monitoring Network is carried out with the objective to monitor how activities of the radionuclides ionising radiation doses are distributed within the Czech Republic territory, in space and time, and especially to establish long-term trends and to detect, in time, any deviations from those trends. Attention is paid to artificial radionuclides which in measurable amounts occur and are monitored in the atmosphere: ^{137}Cs, ^{90}Sr, $^{239+240}$Pu, ^{85}Kr; ^{137}Cs, ^{90}Sr , 3H - in victuals, and ^{137}Cs - in human body.

The participation in the international exercises has confirmed that the Czech Radiation Monitoring Network is comparable with European standards as to its equipment and the density of measuring points.

10.1.3 Regulatory activities

The Atomic Act entrusted state supervision of radiation protection in the Czech Republic to the SÚJB. The SÚJB is thus authorised to issue the relevant implementing regulations, licences for handling ionising radiation sources and for other specified in the Act practices which may lead to exposure (chapter 3.1.2 of this National Report).

Inspection activities related to radiation protection carry out the SÚJB radiation protection inspectors. At present, there are altogether 40 inspectors, at the Central Office in Prague and at 6 Regional Centres distributed all over the State territory. To become an inspector the person shall prove hers/his professional competence in the controlled area, he must be a specialised university graduate with at least 3 year professional practice. Inspectors are appointed by the SÚJB Chairman (more details in chapter 3. of this National Report).

10.2 Statement on implementation of the obligation concerning Article 15

The requirements of Article 15 of the Conventions are in the Czech Republic fulfilled, both in the legislation and in its implementation.

11. Emergency Preparedness - Article 16 of the Convention

1. Each Contracting Party shall take the appropriate steps to ensure that there are on-site and off-site emergency plans that are routinely tested for nuclear installations and cover the activities to be carried out in the event of an emergency. For any new nuclear installation, such plans shall be prepared and tested before it commences operation above a low power level agreed by the regulatory body.

2. Each Contracting Party shall take the appropriate steps to ensure that, insofar as they are likely to be affected by a radiological emergency, its own population and the competent authorities of the States in the vicinity of the nuclear installation are provided with the appropriate information for emergency planning and response.

3. Contracting Parties which do not have a nuclear installation on their territory, insofar as they are likely to be affected in the event of a radiological emergency at a nuclear installation in the vicinity, shall take appropriate steps for the preparation and testing of emergency plans for their territory that cover the activities to be carried out in the event of such an emergency.

11.1 Description of the current situation

11.1.1 General description of acts, regulations, decrees and requirements for on-site and off-site emergency preparedness

The legislative framework for the emergency preparedness of nuclear installations and their surroundings is given by the Act No. 18/1997 Coll., on Peaceful Utilisation of Nuclear Energy and Ionising Radiation (the Atomic Act), its implementing regulations and related government ordinances (see chapter 2.1.2 of this National Report).

Article 2 of the Atomic Act defines the basic terms - emergency preparedness, radiation emergency, radiation accident and emergency plans (on-site, off-site).

In accordance with Article 3, the SÚJB within its competence:

- approves on-site emergency plans and their modifications, subject to discussion with the relevant District Authority of their compatibility with off-site emergency plans; the approval of on-site emergency plan is one of conditions for obtaining permit for the installation commissioning and its operation licence,
- establishes emergency planning zone - upon the licensee proposal,
- co-ordinates the activity of the National Monitoring Network and functions as its head office,
- provides for the activities of an Emergency Response Centre and for an international exchange of information on radiation situation,
- by means of the National Radiation Monitoring Network and based on assessment of the radiation situation, ensures the background information necessary to decide on the measures aimed at reducing or averting exposure in the event of a radiation accident,
- is 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.

In its Article 4 the Atomic Act establishes the principles for averting or reducing exposure due to radiation accidents and exposure of people who participate in the mitigating interventions. These principles are elaborated in Regulation No. 184/1997 Coll., on Requirements for Radiation Protection Assurance.

Article 17 of the Atomic Act establishes, besides other obligations, the obligation of a licensee to ensure emergency preparedness, including its verification, in the scope appropriate for the particular licences, and to report to the SÚJB any change impacting on emergency preparedness, including changes in any facts on which issue of the licence was based.

Article 18 of the Atomic Act establishes, besides other obligations, the obligation of a licensee to:

- monitor, measure, evaluate, verify and record values, parameters and facts with an impact on emergency preparedness, to the extent laid down in implementing regulations,
- keep and archive records of ionising radiation sources, facilities, materials, activities, values, parameters and other facts important for emergency preparedness, and submit the recorded information to the SÚJB in the manner set out in an implementing regulation,
- ensure systematic supervision of observance of emergency preparedness, including its verification.

Article 19 of the Atomic Act establishes, besides others, the obligation in the event of radiation emergency, to the extent and in the manner determined by the on-site emergency plan approved by the SÚJB, to:

- notify without delay the relevant District Authority, the SÚJB and other relevant bodies specified in the on-site emergency plan, of the occurrence or suspected occurrence of a radiation emergency,
- in the event of a radiation emergency, ensure that a warning is given to the public within the emergency planning zone,
- ensure that the consequences of the radiation accident are dealt within premises, where his activities are performed and to take measures to protect employees and other persons from the effects of ionising radiation,
- ensure monitoring of exposures of employees and other persons, and prevent any release of radionuclides and ionising radiation into the environment,
- inform relevant bodies, especially of monitoring results, of factual and anticipated development of the situation, of interventions taken to protect employees and the public, and measures taken to deal with the radiation accident and also of factual and anticipated exposure of people,
- control and regulate exposure of employees and other persons participating in the radiation accident mitigation within the premises where the licensee performs his activities,
- co-operate in dealing with consequences of the radiation accident which occurred on his premises,
- in the event of a radiation emergency, participate in the activities of the National Radiation Monitoring Network.

The same Article also establishes an obligation of the licensee to submit to the appropriate District Authority background documents to prepare the off-site emergency plan and to co-operate with it to ensure emergency preparedness within the emergency planing zone. It also

established, that a government ordinance concerning the emergency planning zone will set out his financial share in covering activities of the National Radiation Monitoring Network, in providing the public within the emergency planning zone of relevant installations or workplaces with antidotes, running a press and information campaign aimed at ensuring that the public is prepared for radiation emergencies, in providing a system for notification of relevant bodies, as well as his obligation to participate in radiation accident clean-up operations within the emergency planing zone.

In relation with the issuance of the new Atomic Act, some other acts were altered and amended and tasks and obligations of some central bodies of the State administration concerning emergency preparedness, were defined. Among the first has been altered and amended Act No. 425/1990 Coll., on District Authorities and Amendment of their Competence, to include:

- requirement to draw up an off-site emergency plan for dealing with extraordinary events, radiation emergencies, and to verify emergency preparedness as defined in the off-site emergency plan,
- requirement to co-ordinate the preparation of an off-site emergency plan for the emergency planning zone in the event of an accident that could affect more than one district, the chairman of the District Authority on whose territory the nuclear installation is sited, shall ensure co-ordination of the joint effort in dealing with the emergency,
- the Ministry of Interior, by agreement with the SÚJB, is obliged to control and co-ordinate District Authorities in matters of emergency preparedness and elimination of the consequences of a radiation accident.

The Atomic Act authorised the Ministry of Interior to issue a regulation, which will establish details for preparation of the district emergency plan and off-site emergency plan.

In relation with the Atomic Act were also established tasks and obligation of:

- Ministry of Defence, within the framework of civil defence, to arrange and verify emergency preparedness and monitoring system and notification and warning system, to provide means of collective and individual protection of the public, and also forces and means for dealing with the consequences of a radiation accident,
- Ministry of Health to create a system of special medical care provided by selected clinics to persons irradiated in the course of radiation accidents.

Details and requirements for emergency preparedness in the event of an extraordinary situation (radiation emergencies and accidents) are established in the implementing regulations related to the Atomic Act:

- ***SÚJB Regulation No. 219/1997 Coll.,*** on Details in 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,
- ***SÚJB Regulation No. 184/1997 Coll.,*** on for Radiation Protection Requirements.

Regulation No. 219/1997 Coll., establishes details of assuring emergency preparedness of nuclear installations, such as:

- detection of extraordinary event,
- assessment of the extraordinary events significance and their classification as one of three basic levels,

- announcing an extraordinary event,
- activation of persons participating in the intervention,
- control and performance of the intervention,
- requirements for the intervention procedures and instructions,
- requirements for the radiation situation monitoring programme,
- methods to reduce exposure of the personnel and other persons,
- medical care principles,
- ensuring documenting of the activities in the course of an extraordinary event,
- submitting to the SÚJB information on the occurrence and development of an extraordinary situation,
- requirements for personnel and other persons training,
- requirements for the emergency preparedness verification , including emergency exercises and functionality checks of technical means and devices required for control and performance of the intervention,
- requirements for the contents of an on-site emergency plan,
- requirements for other documentation related to emergency preparedness.

Regulation No. 184/1997 Coll. establishes details in the manner and scope of radiation protection assurance during interventions to reduce exposures due to radiation emergencies. It also establishes reference values for the immediate and follow-up protective interventions(§ 64 - § 66 of Appendix No. 8 to this Regulation).

11.1.2 Implementation of emergency preparedness tools, role of the State Regulatory Body and other relevant bodies

Classification of emergency situations

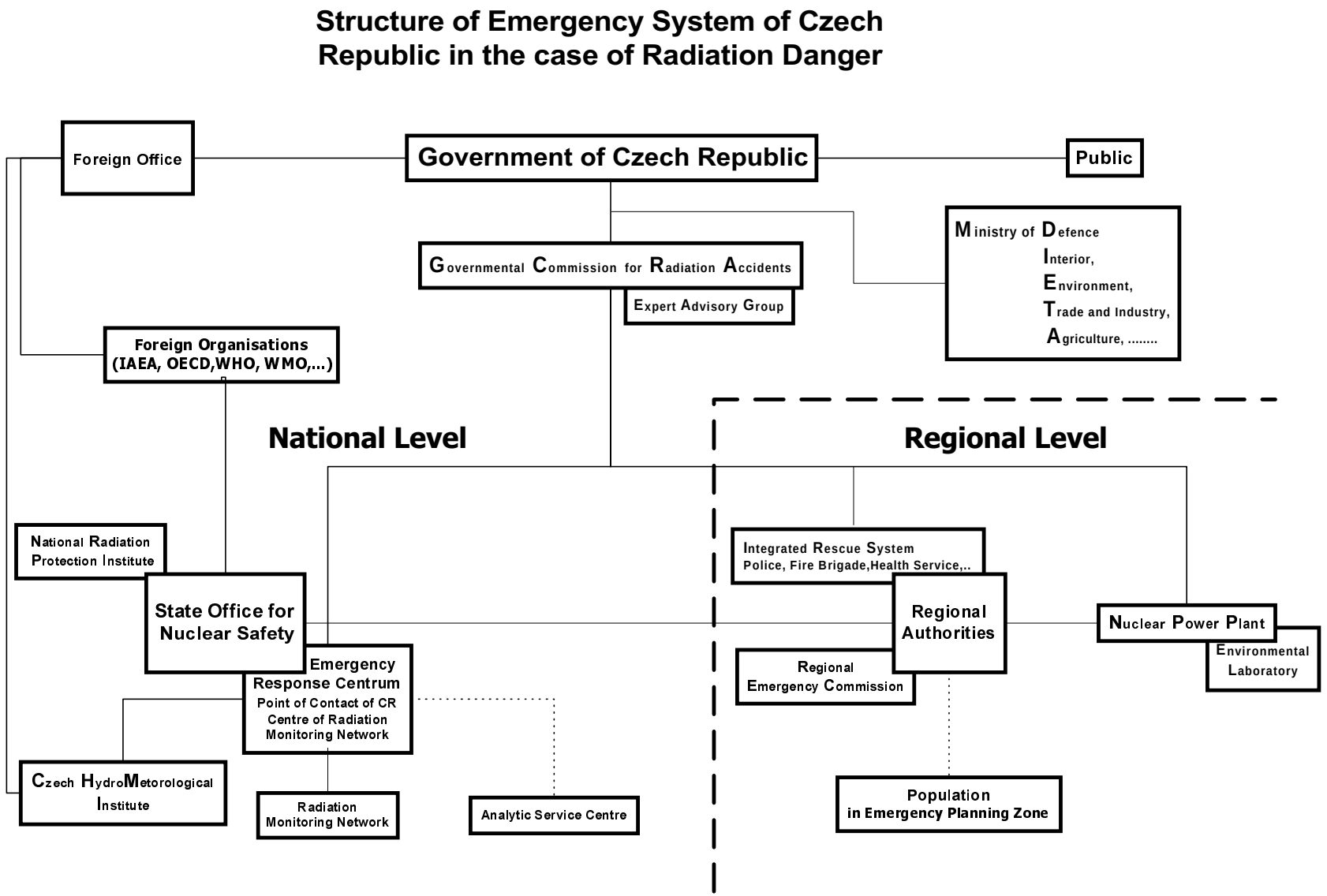
To assess significance of extraordinary events (operational occurrences) which may occur during operation of a nuclear installation, these events are classified as of three basic degrees (§ 5 of the SÚJB Regulation No. 219/1997 Coll.):

- ***1st degree - extraordinary event*** which leads to or may lead to an inadmissible exposure of the personnel and other persons or inadmissible release of radioactive substances into the environment; 1st degree event can be a radiation emergency, it has a limited local character, forces and means represented by operators or work shift are sufficient to deal with it,
- ***2nd degree - extraordinary event*** which leads to or may lead to an inadmissible significant exposure of the personnel and other persons or inadmissible release of radioactive substances into the environment; event of 2nd degree is a radiation emergency, to control this situation requires activation of the intervening personnel of the licensee and it can be dealt with by forces and means of the licensee or forces and means contracted by the licensee,
- ***3rd degree - extraordinary event*** which leads to or may lead to an inadmissible significant release of radioactive substances into the environment which requires implementation of urgent measures for protection of the public and the environment, specified in the off-site emergency plan; 3rd degree event is a radiation accident and control of this situation requires (besides the activation of intervening personnel of the licensee and intervening persons according to the off-site emergency plan) involvement of other relevant bodies.

Diagram of national emergency preparedness

Fig. 16-1 shows diagram of the current structure of the Czech emergency preparedness system for the event of a radiation accident in this country and abroad.

Obr. 11-1


Structure of Emergency System of Czech Republic in the case of Radiation Danger
Foreign Office
Government of Czech Republic
Public
Governmental Commission for Radiation Accidents
Expert Advisory Group
Ministry of Defence
Interior,
Environment,
Trade and Industry,
Agriculture, ...
Foreign Organisations (IAEA, OECD,WHO, WMO,...)
National Level
Regional Level
National Radiation Protection Institute
State Office for Nuclear Safety
Emergency Response Centrum
Point of Contact of CR
Centre of Radiation Monitoring Network
Czech HydroMetorological Institute
Radiation Monitoring Network
Analytic Service Centre
Integrated Rescue System
Police, Fire Brigade,Health Service,..
Regional Authorities
Regional Emergency Commission
Nuclear Power Plant
Environmental Laboratory
Population in Emergency Planning Zone

From the text above, it is obvious, that the Government is the highest competent body for management of emergency situations on the territory of the Czech Republic. The Government established by its Decision No. 187/1992 the Governmental Commission for Radiation Accidents (see Figure 11-1) as a direct successor of former Government Accident Commission of the Czech and Slovak Federal Republic. Subsequent Decision No. 496/1993 defined position and basic tasks of the Governmental Commission for Radiation Accidents.

Governmental Commission for Radiation Accidents is an advisory and supporting body for the Government for top level co-ordination of all activities in case of radiation accident both on territory and out of territory of the Czech Republic.

Main tasks of the Governmental Commission for Radiation Accidents, described in its Status, are focused mainly on:

- co-ordination of emergency preparedness plans to protect the public and environment,
- inspection of emergency preparedness,
- assessment and corrections of activities in case of radiation accident.

Minister of environment was appointed as a Governmental Commission for Radiation Accidents chair and head of SÚJB as his deputy. Besides this, members of the Commission are deputy ministers of all other involved resorts (ministry of interior, finance, agriculture, defence, foreign affairs, transport) and, if necessary, heads of the organisations which belongs to their competence.

A Technical Support Group was established to support the Governmental Commission for Radiation Accidents. The Group is composed of experts mainly from the area of nuclear safety and radiation protection, but also from other areas (for instance civil defence, hygienic service, veterinary service, and others). In addition, the Governmental Commission for Radiation Accidents use for its purposes Emergency Crisis Centrum, established within the SÚJB structure (for details see pages 88 and 89 of the National Report).

On-site and off-site emergency plans of nuclear installations including supporting bodies and systems

On-site emergency plans of nuclear installations (licensees) are prepared in compliance with requirements for emergency preparedness assurance, and in the extent established by Regulation No. 219/1997 Coll. Those requirements:

- establish the organisational structure of the licensee and principles for control and mitigating interventions in the event of emergency occurrence. In this connection, they define duties of persons and on-site organisational departments and units in an emergency, classified in accordance with their significance as extraordinary events as it was specified in chapter 11.1.2,
- establish the method of notification of persons and units of the licensee, and other external units and bodies which have to be called in to perform an intervention within the nuclear installation premises (licensee),
- establish methods of notification of the SÚJB and other State administration bodies (District Authorities to which territory reaches the emergency planning zone) on the occurrence of an extraordinary event of 1st and 2nd degree, and in the event of an

extraordinary event of 3rd degree - radiation accident - the methods of their notification and warning the public within the emergency planning zone.

On-site emergency plans comprise the radiation situation monitoring programme during extraordinary events (operational occurrences) for the nuclear installation premises (licensee) and for its neighbourhood. The plans establish methods of notification and warning of those personnel and persons at nuclear facility (licensee) for the individual degrees of extraordinary events, who are not assigned for performing control and intervention, and whose health and life has to be protected, whose exposure has to be reduced. These plans define principles and procedures of assembling, sheltering, evacuation, providing emergency first medical aid to all employees and persons affected, including medical care and specialised medical care. The on-site emergency plans establish also principles and procedures for collaboration with District Authorities within the emergency planning zone, which includes providing information on the path and development of the extraordinary even, and its impacts on the public in the neighbourhood of the nuclear installation (licensee), and on the manner of collaboration in ensuring evacuation of the employees and persons from nuclear installation (licensee), in relation to the off-site emergency plan. The on-site emergency plan establishes principles and procedures for documenting all activities from the moment of the emergency occurrence and during it, as well as methods and procedures for transmitting to the SÚJB information and data on the conditions of the nuclear installation technology, radiation situation within the nuclear installation and its neighbourhood, including meteorological situation.

Control and intervention procedures for the assigned persons and units of the nuclear installation (licensee), including personnel and persons protection established in the on-site emergency plan, are elaborated as the intervention instructions which concretise their activities at an extraordinary event of each degree, and specify necessary technical, instrumental and material background.

The current off-site emergency plans for an emergency planning zone are prepared for nuclear power plant Dukovany, for which the former ČSKAE established in its decision the emergency planing zone in 1991. They are drafted for three District Authorities. Třebíč, Znojmo and Brno-country, in accordance with the requirements established by the manual [11-1]. Those plans set down tasks and duties of the District Authorities and their advisory bodies (district Emergency Commissions), including organisational structure and persons assigned for controlling and carrying out tasks within individual types of protective intervention during radiation accidents. They also set down the targets and methods of ensuring the individual protective measures:

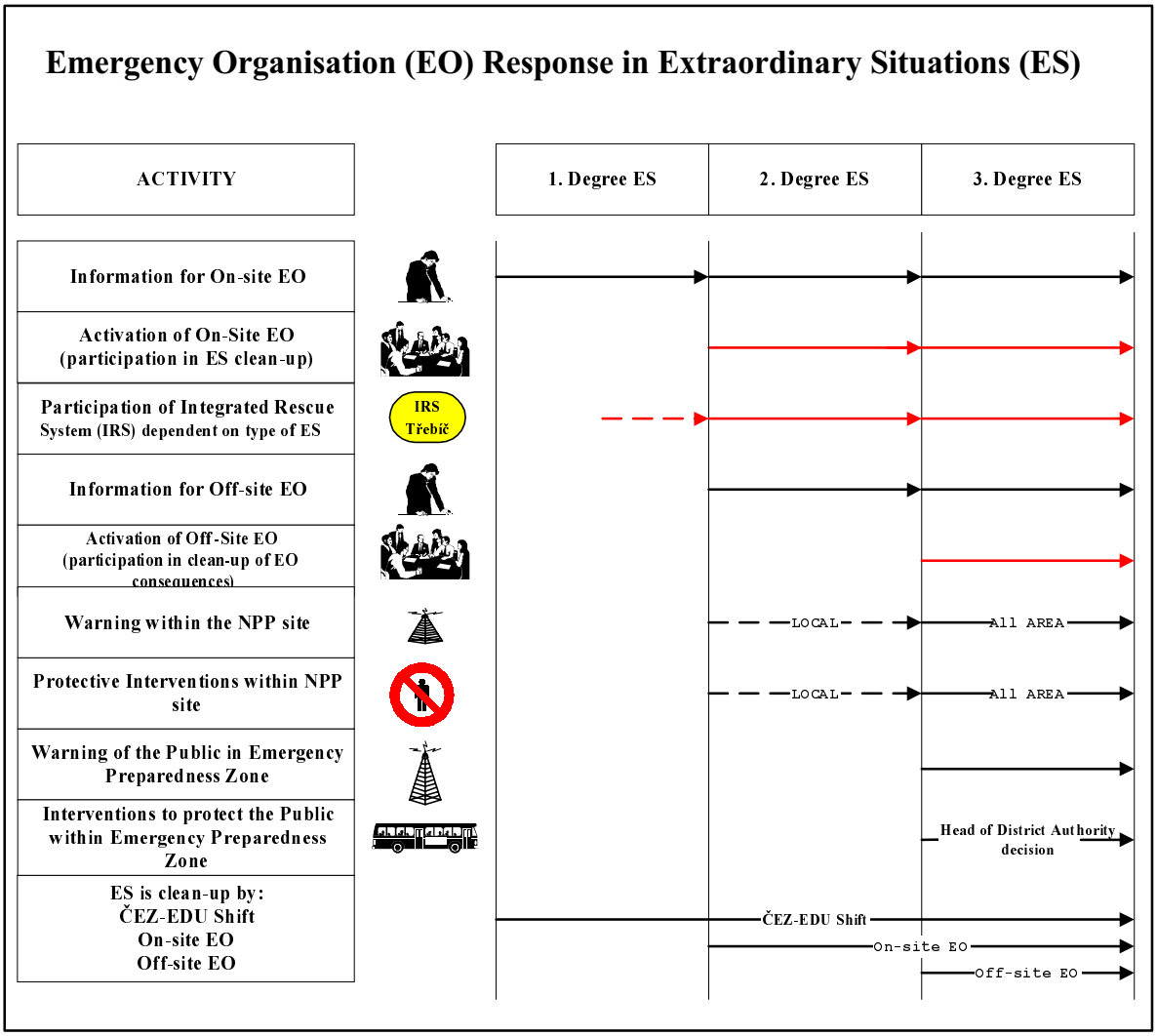
- notification of authorities and organisations,
- warning of the public,
- sheltering people,
- evacuation of people, including dosimetric monitoring and decontamination at the exits from the contaminated territory,
- regulation of people movements within the endangered territory,
- health care.

After the District Authorities have been notified, the most important measure for protection of the public is a warning issued in the emergency planning zone, which according to the on-site emergency plan is ensured by the nuclear power plant. In the early stage of a radiation accident, the public within the emergency planning zone (20 km around the power plant) is

warned by a signal of sirens with following broadcasting of the prepared initial information on the radiation accident which occurred at the nuclear power plant, and on the measures to be carried out by the public (sheltering, iodine prophylaxis - taking KI preparation) and recommendation on the preparation for evacuation of people within 5 km zone around nuclear power plant and in 5 out of 16 sectors up to 10 km in the direction of wind. Iodine prophylaxis (KI preparations) are distributed in advance to the population within the emergency planning zone (families, schools, hospitals, workplaces; the District Authorities have approximately 10 % reserve of KI doses, and these preparations are on sale in pharmacies). Preparations of potassium iodide held by the public are regularly exchanged by the District Authorities before their expiration deadline. The off-site emergency plans also establish tasks of regulating movement of the public within the endangered territory, manner and performance of the evacuation which is carried out upon decisions of the heads of District Authorities in accordance with the SÚJB information. Established are also check points at the exits from affected territory within the emergency planning zone where a dosimetric monitoring of persons and means of transport is planned and carried out, including their decontamination. Off-site emergency plans establish principles and methods of health care for the public affected by the radiation accident.

On-site emergency plan of nuclear power plant Dukovany, as a whole, establishes itemisation of the on-site emergency organisation, principle of its activity, limitations and principles for clean-up of the consequences of extraordinary events, with the fist priory ascribed to protection of the employees and persons within the plant site, and in respect to the off-site emergency plan and protection of the public - within the emergency planning zone.

The scope of interventions taken as a response to an individual extraordinary event is obvious from the following review:



The SÚJB is responsible for negotiations on link-ups between the emergency plans of nuclear installations and off-site emergency plans of District Authorities.

Link-ups from the aspect of notification and warning of off-site subjects (link-ups between the on-site emergency plan of NPP Dukovany and off-site emergency plans of District Authorities are schematically shown in the Fig. 11-2 and 11-3:

Obr. 11-2

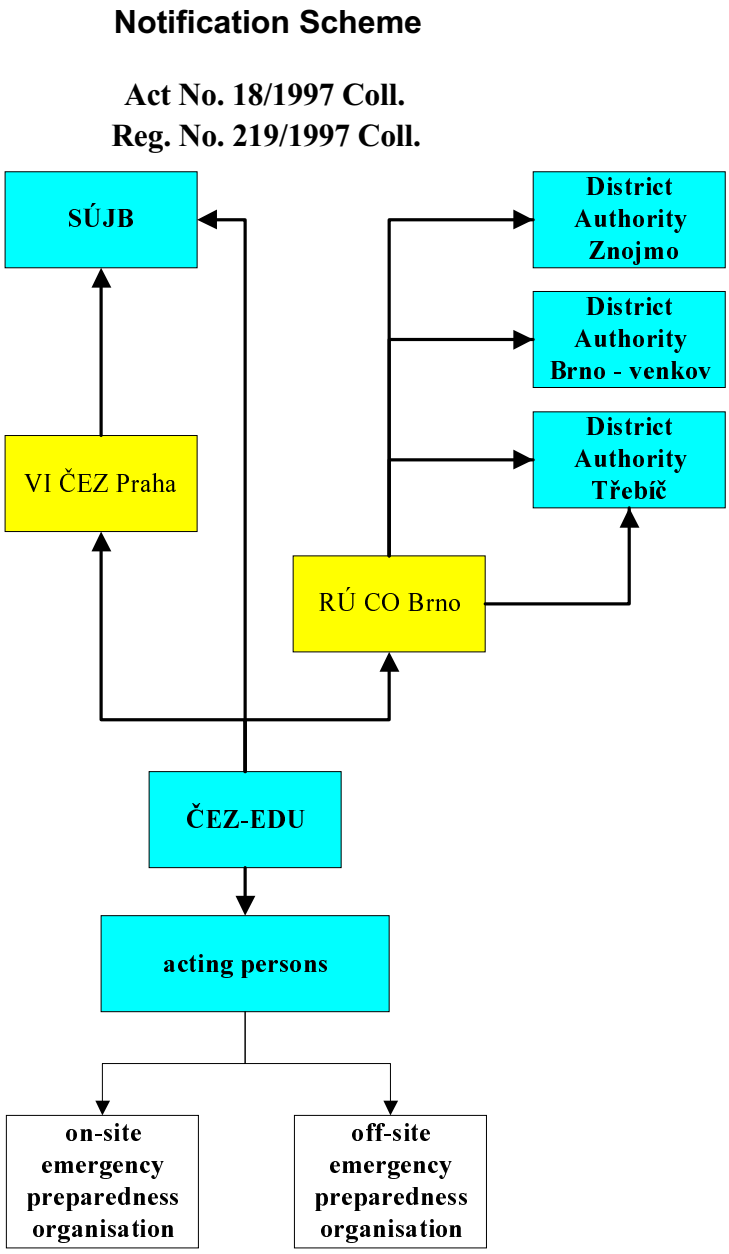
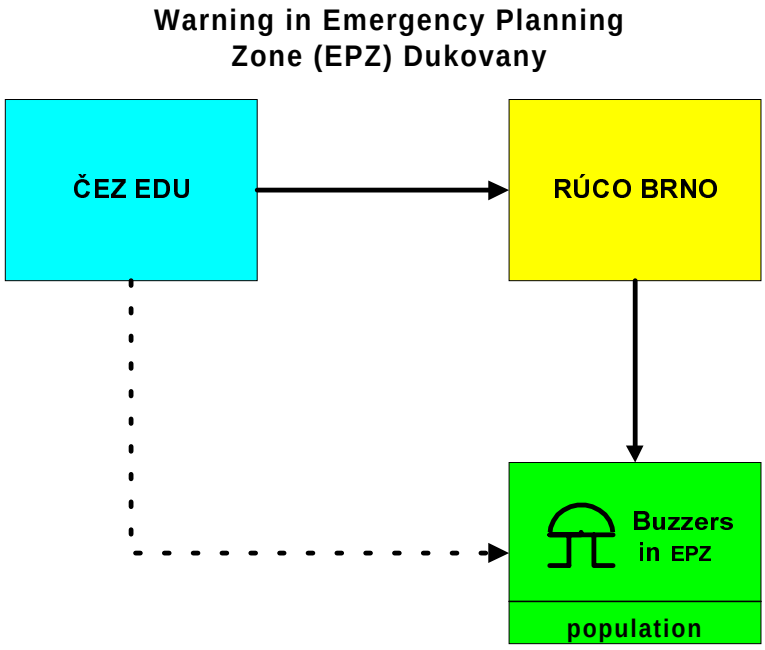

Notification Scheme
Act No. 18/1997 Coll.
Reg. No. 219/1997 Coll.
SÚJB
District Authority Znojmo
District Authority Brno - venkov
District Authority Třebíč
VI ČEZ Praha
RÚ CO Brno
ČEZ-EDU
acting persons
on-site emergency preparedness organisation
off-site emergency preparedness organisation

Fig. 11-3



In accordance with provisions of the Atomic Act, in the event of radiation emergencies and radiation accidents, the SÚJB provides for the activities of the Emergency Response Centre, it also acts as the Contact point for the notification of radiation emergencies and radiation accidents, co-ordinates the activity of the National Monitoring Network and functions as its head-office.

In the case of an extraordinary event, activities of the Emergency Response Centre are directed at:

- assessment and prediction of the development in the technology conditions in relation to the personnel interventions, including determination of the source term for radioactive substances release into the environment on the basis of information and data received from the nuclear installation in question, using technical means, methodical and software tools,
- evaluation of the compliance with the on-site emergency plan,
- assessment of radiation situation within the nuclear installation based on information and data received from the nuclear installation in question, using technical means, methodical and software tools,
- collaboration with the Czech Meteorological Institute on the prediction of radioactivity spreading from the place of accident, and on preparing information on possible danger in the nuclear installation neighbourhood depending on the meteorological situation and the predicted development of the accident, including determination and re-evaluation of possible levels of the radiation situation on the basis of information on radioactive substances release from the nuclear installation,
- more accurate re-evaluation of the radioactivity release source term and the affected area - on the basis of the received data and information from radiation monitoring by the nuclear installation teledosimetric system, mobile groups of the nuclear installation and the

Radiation Monitoring Network - in the nuclear installation neighbourhood, airborne groups and activated units of the Radiation Monitoring Network - within the Czech Republic territory, using technical means, methodical and software tools,

- preparation - for the relevant District Authorities, of proposals on the public and the environment protection within the emergency planning zone of the nuclear installation, drafting information and reports on the occurrence and development of a radiation accident, including information on the radiation situation, on the implemented measures for the public and environment protection, or - on their cancelling, for the Governmental Commission for Radiation Accidents, the Government itself, other State administration bodies and mass media,
- notification of the IAEA in accordance with " The Convention on Early Notification of a Nuclear Accident" and "The Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency" and the State contact points - on the basis of the international bilateral agreements.

Information provided to the public, including the emergency preparedness in the nuclear installation neighbourhood

Nuclear power plant Dukovany distributes each year and to each household within the emergency planning zone "The public protection manual - in the event of a radiation accident at nuclear power plant Dukovany" which serves to inform the public within the emergency planning zone.

The manual informs how to proceed after the warning signal, on sheltering, application of iodine prophylaxis and evacuation, including evacuation routes in dependence on the meteorological situation for 16 wind directions.

The public receives information also at "Information Centre of Nuclear Power Plant Dukovany", information is also provided by representatives of the nuclear power plant and the SÚJB if requested by the relevant District Authorities.

11.1.3 Training

Nuclear power plants have developed plans for the theoretical and practical training of their employees and other persons related to the occurrence of an extraordinary event of different degree. Special plans of the theoretical and practical training are prepared for persons and units assigned in the on-site emergency plan for the control and the performance of interventions, with emphasis on their activities during corresponding extraordinary event (each degree), in accordance with the intervention procedures established by the on-site emergency plan. Training is carried out according to the training plans with special attention paid to verification of the control and intervention procedures starting from the moment of an extraordinary event occurrence, in accordance with the established intervention procedures and intervention instructions.

The Czech Republic has joined in the international training, carried out for instance - within the framework of INES, NATO, and other.

11.2 Statement on implementation of the obligation concerning Article 16

The Czech Republic has implemented all measures ensuring that nuclear installations have the regularly verified on-site and off-site emergency plans, and which cover activities to be performed in the event of an accident. The plans are prepared and verified before the nuclear installation begins its operation above the minimum level of power established by the Regulatory Body. At the same time, such measures are taken which ensure that the public in the neighbourhood of nuclear installation which may be feasibly affected by a radiological accident, and the relevant competent State administration bodies, receive the corresponding information for the emergency preparedness and mitigating interventions. A major part of the necessary legislation has been passed, the remaining part is under preparation.

12. Siting - Article 17 of the Convention

Each Contracting Party shall take the appropriate steps to ensure that appropriate procedures are established and implemented:

(i) for evaluating all relevant site-related factors likely to affect the safety of a nuclear installation for its projected lifetime;

(ii) for evaluating the likely safety impact of a proposed nuclear installation on individuals, society and the environment;

(iii) for re-evaluating as necessary all relevant factors referred to in subparagraphs (i) and (ii) so as to ensure the continued safety acceptability of the nuclear installation;

(iv) for consulting Contracting Parties in the vicinity of a proposed nuclear installation, insofar as they likely to be affected by that installation and, upon request providing the necessary information to such Contracting Parties, in order to enable them to evaluate and make their own assessment of the likely safety impact on their own territory of the nuclear installation.

12.1 Description of the current situation

12.1.1 Description of licensing process, including summary of national legislation

The description of so called ”licensing” process in general - for siting, designing, construction, operation and decommissioning of a nuclear installation is in chapter 2.1.2 of this National Report. As it was said in chapter 3.1.2, the SÚJB licence is required for siting of a nuclear facility in accordance with the Atomic Act provision of Article 9, para 1, letter a), as for one of the practices influencing nuclear safety and radiation protection. At the same time, prerequisites for issue of a licence, under Article 13, are:

- an environmental impact assessment according to Act No. 244/1992 Coll., on Environmental Impact Assessment,
- an approval of the quality assurance programme for the licence practice.

The legislative framework applicable for issue of the site approval from the aspect of nuclear safety and radiation protection, is represented by the Atomic Act and its implementing regulations:

- ***Regulation of the SÚJB No. 215/1997 Coll.,*** on Criteria or Siting for Nuclear Facilities and Very Significant Ionising Radiation Sources,
- ***Regulation of the SÚJB No. 214/1997 Coll.,*** on Quality Assurance in Activities Related to the Utilisation of Nuclear Energy and in Radiation Practises, and Laying Down Criteria for the Assignment and Categorisation of Classified Equipment into Safety Classes,
- ***Regulation of the SÚJB No. 184/1997 Coll.,*** on Radiation Protection Requirements,
- ***Regulation of the SÚJB No. 144/1997 Coll.,*** on Physical Protection of Nuclear Materials and Nuclear Facilities and their Classification.

A licence application must be accompanied by the following documentation:

I. Initial Safety Analysis Report, the content of which shall include:

1. description and evidence of suitability of the selected site from the aspect of

siting criteria for nuclear installations and very significant ionising radiation sources as established in a legal implementing regulation;

2. description and preliminary assessment of design conception from the aspect of requirements laid down in an implementing regulation for nuclear safety, radiation protection and emergency preparedness;
3. preliminary assessment of impact of operation of proposed installation on personnel, the public and the environment;
4. proposal of conception for safe termination of operation;
5. assessment of quality assurance in process of selection of site, method of quality assurance for preparatory stage of construction and quality assurance principles for linking stages.

II. Analysis of needs and possibilities to provide physical protection.

Regulation No. 215/1997 Coll. establishes criteria for the assessment of the particular site suitability from the standpoint of nuclear safety and radiation protection. At the same time, protection of other interests following from the valid legislation remains preserved. This Regulation defines the exclusion and condition criteria.

Exclusion criteria are those limiting characteristics which unequivocally exclude utilisation of a particular region for siting nuclear facilities. These criteria include radiological impacts of the planned installation under the normal operating conditions, as well as effects of the site on nuclear safety and radiation protection of the same nuclear installation.

Condition criteria are such characteristics which make an area or land suitable for siting nuclear facilities under the condition that it is feasible or technically possible to offset the unfavourable regional conditions, both natural and caused by human activities.

Implementing Regulation on nuclear safety assurance of nuclear facilities in the process of their design, licensing, commissioning and construction and especially valid Regulation of the SÚJB No. 215/1997 Coll., on Siting Criteria for Nuclear Installations and Facilities with Very Significant Sources of Ionising Radiation, take into account the IAEA recommendations and guidelines for the nuclear installations siting.

The mentioned implementing regulations of the Atomic Act, in accordance with the IAEA recommendations, require that assessments within the siting process should consider historically most significant phenomena registered in the particular locality and its vicinity, as well as combination of natural phenomena, phenomena resulting from human activity and accident conditions due to these phenomena. Within the siting and design, nuclear installations must be evaluated as to their resistance against the following natural phenomena and phenomena caused by human activity:

- earthquakes,
- climatic effects (wind, show, rainfall, temperature of environment etc.),
- floods and fires,
- aircrash and flying and falling missiles,
- explosions of industrial, military and transport means, including nuclear installations,
- releases of dangerous and explosive fluids and gases.

Probabilistic assessment may permit to exclude some of these events, if the probability of their occurrence is very low. It is in the SÚJB competence to establish such limiting values for each of those cases.

12.1.2 Measures for fulfilment of siting criteria for nuclear installations

12.1.2.1 Nuclear power plant Dukovany

Site geographic position

The nuclear power plant Dukovany site is located in south-eastern part of the district of Třebíč, south-east from town Brno on the right bank of Jihlava river. Location of the site in the Czech Republic is shown in the Fig. 1-1 map (chapter 1 of this National Report). Nuclear power plant is positioned 45-50 km from State border with Austria. The northern part of the district is a broken stretch of land with Jihlava river valley, in the southern part it changes into a plain. The district altitude varies from 369 up to 711 m. There are smallish towns in the nuclear power plant vicinity - Třebíč, Náměšť nad Oslavou, Moravské Budějovice, Moravský Krumlov and Jaroměřice nad Rokytnou. Town Brno with approximately 500 000 inhabitants is 35 km north-east of the plant. Within a 20 km radius, according to 1993 data, lived approximately 104 000 inhabitants (information from emergency plans of the districts of Třebíč, Znojmo and Brno-country). Population density in other parts of the territory is very low, with only small settlements.

The site has been selected so as to minimise possible interactions of the nuclear installation with the adjacent territory. Thus, in the immediate vicinity there are no large industrial facilities or frequented transport routes. Density of industrial facilities near Dukovany is significantly lower than in other parts of the Czech Republic territory. Immediate vicinity of the nuclear power plant has unequivocally agricultural character, and there are only a few small industrial works.

Protection against earthquakes

Seismic assessment has been performed for the area circumscribed by a circle of 200 km radius around the nuclear power plant in its centre.

Geological surveys and existing information on the underlying rock under the cooling towers foundations are assessed as adequate, surveys of the area under the reactor buildings I and II and the adjacent buildings had same results. Constructions classified as 1st category of seismic resistance (as the reactor buildings) are founded on underlying rock of high quality with the underground water below the level of foundations. Very high surface spring constant of the elastic bearing 200 MPa/m in the vertical direction and 140 MPa/m in the horizontal direction corresponds to an underlying rock of a high quality on which the reactor building is founded. Geological maps, geological profiles and the boreholes characteristics are attached to the reports used for the preparation of the Pre-operational Safety Analysis Report for nuclear power plant Dukovany, revision 1 [12-1].

At Dukovany site, the greatest possible effects of an earthquake may be expected, according to historical data, from the Alps seismic focuses. From the analyses which consider both the greatest possible magnitude of shocks and most adverse attenuation of intensities with the distance in seismic focus - Dukovany, follows that entirely theoretically a maximum of micro-seismic intensity which may be expected at Dukovany site is 6 MSK. Calculations of the seismic risk have resulted in the limiting value of micro-seismic intensity which should be not exceeded even within 10 000 years period.

Analyses performed at the same time confirmed non-existence of local tectonic shocks. No observed effects of any earthquakes were reported for Dukovany village. Closest local shocks originated in Jindřichův Hradec area, where epicentral intensities did not exceed 5 MSK-64, and their microseismic fields did not reach Dukovany region.

The seismic characteristics obtained as a result of the facts mentioned above using most conservative approach are:

- operating basis earthquake is equal to the maximum historically observed earthquake in the area, i.e. 6 MSK-64,
- safe shutdown earthquake is equal to the maximum estimate of the maximum possible expected earthquake, i.e. 6 MSK-64 + 0.5 MSK-64 (error in the determination of intensity).

This means that due to seismically entirely calm area and stability of the underlying rock, nuclear power plant Dukovany can not be endangered by a seismic event. Despite that, as a contribution to safety, maximum conservative approach has been used, and in compliance with the IAEA recommendations and considering the results presented above, for the Dukovany site has been determined level SL-1 equal to 6 MSK-64 and level SL-2 equal to 0.1 g acceleration (which in the conditions of Central Europe corresponds to the intensity of 7 MSK-64 - higher than the most conservative estimate of the safe shutdown earthquake).

Protection against floods and adverse climatic phenomena

The largest river in the vicinity is Jihlava river, north of Dukovany plant, from which technological water is taken and into which the waste water is discharged. The power plant site is located approximately 100 m above the maximum levels. On Jihlava river, near power plant was built a system of waterworks Dalešice - Mohelno - pumped-storage hydro-electric power plant. Jihlava river flow at the in-flow to waterworks Dalešice varies around annual value of 6 m^3s^{-1}.

Analysis of floods and prediction scenarios of floods show that the locality of nuclear power plant has never been and is not endangered by floods.

Specific knowledge of the meteorological situation in the vicinity of the nuclear power plant is necessary to determine influence of cooling towers and to assess the radioactivity spread, therefore a special attention was paid to cumulating of such knowledge. Nuclear power plant is located within Atlantic-continental area of temperate climatic zone of the northern hemisphere. Here, in the course of a year, air masses of oceanic and continental origin alternate, which is connected with a frequent passages of atmospheric fronts. The specific meteorological measurements and observations at the site have been carried by the

meteorological observatory of Czech Meteorological Institute at Dukovany since June 1982, without interruptions. For its regular synoptic and climatological measurements the observatory uses standard meteorological instruments.

Adverse meteorological conditions for the locality in question, such as windstorms, precipitation and extreme temperatures have been considered in the design.

Protection against effects caused by aircraft crash

Airspace above nuclear power plant has been proclaimed prohibited for all flights in the document ”Flight Information Manual” which is obligatory for all users of the Czech Republic airspace.

Nuclear power plant is located in a close vicinity of military airfield Náměšť. Flights in this space are allowed up to 1500 m, but the 2 km radius zone around Dukovany is prohibited. Any emergency manoeuvres in the prohibited space and its immediate neighbourhood are not expected, and emergency situations can be practically excluded since in the event of such situation the pilot’s orders are to direct his aeroplane to uninhabited area (before catapulting).

The analyses has shown that the plant is protected against effects caused by a military and civil aircraft crash. Assessment of these effects was performed in accordance with the International Civil Airtransport Organisation (ICAO) guidelines. Results of the calculations have shown that the aircraft crash will not cause inadmissible destruction of the primary system because its civil constructions, important for nuclear safety, are sufficiently resistant against possible impacts of such a crash. The analyses have also shown that the spatially isolated back-up core cooling systems, together with civil construction, ensure that even an aircraft crash will not affect function of the reactor emergency shutdown and cooling.

Protection against explosion pressure waives

Near nuclear power plant Dukovany is a second class road (No. 15) - Brno, Ivančice, Dukovany, Znojmo, Jaroměřice nad Rokytnou, Moravské Budějovice. Other roads in the vicinity are less frequented. The analyses have shown that even in the case of very improbable explosion of a transport vehicle carrying a dangerous freight, plant safety will be not affected.

The plant has a railway siding from eastern direction Moravský Krumlov and Brno. Probability of a train accident both in present and in long-term prospect is practically zero.

In the plant vicinity, there are no external sources of potential danger.

Protection against influence of third parties

One of the safety features of a nuclear power plant design is protection against influence of third parties. Safety systems are redundant and spatially distant, the same is valid for their power supply. This engineered safety is supplemented with technical, organisational and regime system of measures which should prevent inadmissible influence of third parties.

12.1.2.2 Nuclear power plant Temelín

Site geographic position

The Temelin site was selected at the seventies/eighties turn as a result of evaluation of the area criteria established by valid at the time Regulation No. 4/1978 Coll. (see review of the legislation development in chapter 2 of this National Report). Location of the site in the Czech Republic is shown in the Fig. 1-1 map. The plant is 45-50 km distant from the State borders with Austria and Germany. Nearest permanently inhabited locality is village Temelín - at a distance 2 km in north-west direction. Distance from Týn nad Vltavou with 7 900 inhabitants is 5 km, and from town Vodňany with 6 400 inhabitants is 14 km. České Budějovice are distant 25 km and their population is approximately 100 000. Within a 30 km radius from the plant, according to 1991 general census of the population, lived approximately 256 000 persons. Population density in other parts of the territory is very low, with only small settlements.

Again, the site has been selected so as to minimise possible interactions of the nuclear facility with the adjacent territory. Thus, in the immediate vicinity there are no large industrial facilities, with exception of pipeline of the transit gas line, or frequented transport routes. Density of industrial facilities in South Bohemia is significantly lower than in other parts of the Czech Republic territory. Immediate vicinity of the nuclear power plant has unequivocally agricultural character, and there are only a few small industrial works. According to the District Authority of České Budějovice, no industrial development in 10 km area in the perspective up to 2020 is planned.

Protection against earthquakes

Despite the fact that the Czech Republic territory belongs among the geologically well surveyed territories, another detailed geological assessment of the area up to the distance of 30 km had been performed in relation with the nuclear power plant siting. Original geological surveys performed during eighties have been supplemented by 1991-1994 surveys in accordance with the IAEA recommendations.

Geological underlying rock of the locality is represented by South-Bohemian branch of Molanubikum and South-Bohemian basins. Both units belong to the Bohemian massif which was created by the end of Paleozoic Era in the final phase of Varisk rockforming cycle. Most frequent rock here are gneisses, granites and quartz. The plant site has a rock substratum, the reactor buildings are positioned on a homogeneous 500 x 500 m block of rock. Geomechanically, the plant underlying rock has a sufficient foundation bearing capacity for buildings and equipment of the nuclear power plant.

Seismic assessment has been performed for the whole area relevant to the plant, circumscribed by a circle of 300 km radius around the nuclear power plant in its centre. The biggest part of this area lies within the Bohemian massif territory, in the south and south-east it reaches Alps-Karpatian region. Moldanubikum under the nuclear power plant is the oldest and most strong part of the Bohemian massif. The seismic risk value is determined by Alps earthquakes. Results of the seismologic analyses show that there are no known cases of local tectonic shocks. No reports on Alps earthquakes with registered intensities in South Bohemia exist for Temelín village.

From the assessments which consider both the greatest possible of shocks from the focuses directly within the concerned area and most adverse attenuation of intensities with the distance seismic focus - nuclear power plant, follows that the limiting value of micro-seismic intensity which should not be exceeded with 0.95 probability even within 10 000 years period is 7^{o} MSK-64, which in the conditions of Central Europe corresponds to 0.1 g. Design acceleration was 0.1 g which is fully conform to the IAEA recommendations issued in 1991. These values have been used both in design and construction of buildings and equipment required to ensure the reactor safe shutdown, the removal of residual heat and prevention of the radioactive substances release (1st category of seismic resistance).

Protection against external floods and adverse climatic phenomena

Operation of the power plant depends on Vltava river from which process water is taken and into which the waste water is discharged. Vltava river represents a main axis of the Czech river system, and a number of water reservoir which had been build on it years ago, so called Vltava river cascade, serves to protect against flooding and some of them help to generate hydroelectric power. A significant benefit provided by the cascade reservoirs is equalisation of the minimum flows. For the needs of nuclear power plant Temelín, two water reservoirs were added to this cascade : Hněvkovice from which technological water will be taken, and Kořensko which will be used to mix the discharged waste water with Vltava water.

Analysis of floods and prediction scenarios of floods show that the locality of nuclear power plant has never been and is not endangered by floods. Main plant buildings which house equipment important for nuclear safety are built at the altitude 510 m. From the assessment of historic extreme flows follows that the plant area is approximately 150 m above the maximum levels. The site has been also assessed from the aspect of possible destruction of water reservoirs on upper course of Vltava river. Break in the Lipno I dam will cause 1460 m^3s^{-1} flow in Hněvkovice profile which will not affect either Hněvkovice dam or the pumping stations of process water.

Specific knowledge of the meteorological situation in the vicinity of the nuclear power plant is necessary to determine influence of cooling towers and to assess the radioactivity spread, therefore a special attention was paid to cumulating of such knowledge. Nuclear power plant is located within Atlantic-continental area of temperate climatic zone of the northern hemisphere. Here, in the course of a year, air masses of oceanic and continental origin alternate, which is connected with a frequent passages of atmospheric fronts (average of 125 fronts a year). Prevailing are such meteorological situations when fronts come from the west, in a lesser degree - from the north. The specific meteorological measurements at the site have started at the time when the meteorological observatory was being built. The observatory is

located at the distance of 3 km and north-west from the nuclear power plant. The measurements begun in April 1988, and are carried out without interruptions since January 1989.

Adverse meteorological conditions for the locality in question, such as windstorms, precipitation and extreme temperatures have been considered in the design.

Protection against effects caused by aircraft crash

Airspace above nuclear power plant has been proclaimed prohibited for all flights by the flight information manual. The nearest flight corridor is 18 km from the plant. Thus, air traffic has no effect on the nuclear power plant. The military airfield at Bechyně, 25 km from the plant, is used infrequently and irregularly.

The analyses has shown that the plant is protected against effects caused by a military and civil aircraft crash. Assessment of these effects was performed in accordance with the International Civil Airtransport Organisation (ICAO) guidelines. Results of the calculations have shown that the aircraft crash will not cause inadmissible destruction of the primary system because its civil constructions, important for nuclear safety, are sufficiently resistant against possible impacts of such a crash. The analyses have also shown that the spatially isolated back-up core cooling systems, together with civil construction, ensure that even an aircraft crash will not affect function of the reactor emergency shutdown and cooling.

Protection against explosion pressure waives

Within 8 km radius around the nuclear power plant 3 branches of the transit gas line of 1400, 1000 and 800 mm diameter are situated. The minimum distance from the plant reactor buildings is 900 m. Transit gas line transports natural gas. Results of the analyses have shown that even the maximum possible accident on the gas line will not impair functions of the buildings and technological equipment. Calculations and analyses performed by professional organisations and research institutes were recognised by the SÚJB as positive.

At the site south-east boundary is a frequented secondary rod No. 105 České Budějovice - Týn nad Vltavou, other rods in the plant immediate vicinity are less frequented. At a distance of 10 km, there are sections of two international roads which are parts of the international routes which are used also for the transportation of hazardous freights (ARD). However, the analyses have shown that even in the case of a very improbable explosion of a transport vehicle carrying a dangerous freight, the plant safety will be not affected.

The nearest railway situated 1.4 km from the plant is the local railway line Číčenice - Týn nad Vltavou with passenger and goods trains. Passenger trains are very infrequent. On this line, probability of an accident of a train with dangerous goods both at present and in long-tern prospect is practically zero.

Protection against influence of third parties

One of the safety features of a nuclear power plant design is protection against influence of third parties. Safety systems are redundant and spatially distant, the same is valid for their power supply. This engineered safety is supplemented with technical, organisational and regime system of measures which should prevent inadmissible influence of third parties.

12.1.3 Activities for preliminary assessment of nuclear installations siting

New Regulation No. 215/1997 Coll. for nuclear installation in operation, besides other, requires that impacts of the external events mentioned in the previous chapters should be re-evaluated, either after a certain time of operation or within the framework of the regular revisions of safety documentation, applying a most advanced scientific and technical tools and taking into account any changes which have occurred at the locality.

12.1.4 Assessment of environmental impact of a nuclear power plant

Systematic assessment of the nuclear power impact on the environment is carried out systematically at both localities. For details - see chapter 10 of this National Report.

12.1.5 International agreements on nuclear installations siting

In accordance with the intergovernmental agreements with Germany and Austria, the Czech Republic passes over to the governmental bodies of these States information on its nuclear installations (including nuclear plant Temelín which is under construction) situated near common border. Information is transferred both regularly (annual meetings) and irregularly - within the agreed meetings or - in writing. The Czech Republic has also signed a general intergovernmental agreement on the exchange of information with another neighbouring country - the Slovak Republic. The obligation to inform about events significant for nuclear safety is stipulated in the Co-operation Agreement on the State Supervision over Nuclear Safety and Nuclear Materials between the Czech Republic and Hungary.

12.2 Statement on implementation of the obligation concerning Article 17

Legislation of the Czech Republic establishes the relevant procedures for assessment of all factors important for safety of a nuclear installation in relation to its siting and for assessment of its environmental impact. At the same time, it introduces the regular re-revaluation regime for all important parameters - within the periodic assessment of nuclear safety assurance, while applying the up-to-date technical tools and knowledge and taking into account any changes which occurred at the locality. It also follows that requirements of the legislation were implemented into the practice. The requirements of Article 17 of the Convention are in the Czech Republic fulfilled.

13. Design and construction - Article 18 of the Convention

Each Contracting Party shall take appropriate steps to ensure that:

(i) the design and construction of a nuclear installation provides for several reliable levels and methods of protection (defence in depth) against the release of radioactive materials with a view to preventing the occurrence of accidents and to mitigating their radiological consequences should their occur;

(ii) the technologies incorporated in the design and construction of a nuclear installation are proven by experience or qualified by testing or analysis;

(iii) the design of a nuclear installation allows for reliable, stable and easily manageable operation, with specific consideration of human factors and the man-machine interface.

13.1 Description of the current situation

13.1.1 Description of licensing process, including summary of national legislation

The so called "licensing process" has been described in general - for siting, designing and construction, operation and decommissioning of nuclear installations in chapter 2.1.2 of this National Report. As it was said in chapter 3.1.2, construction of a nuclear installation is one of the practices for which under the Atomic Act (Article 9, para 1, letter b) is required the SÚJB licence that considers the issues of nuclear safety and protection against ionising radiation. Then, according to Article 13, para 5 prerequisites for issue of such licence are:

- an approval of a quality assurance programme for the licensed practice together with
- an approval a quality assurance programme for the design phase.

The legislative framework governing the issue of a construction license which covers the nuclear safety and radiation protection aspects, is established by the Atomic Act and its implementing regulations, in particular:

- implementing regulation under preparation on Nuclear Safety Assurance in the Process of Nuclear Power Installations Designing, Licensing and Construction which substitutes the former ČSKAE Decree No. 2/1978 Coll. (see chapter 2.1.1 of this National Report)
- ***Regulation of the SÚJB No. 214/1997 Coll.,*** on Quality Assurance in Activities Related to the Utilisation of Nuclear Energy and in Radiation Practises, and Laying Down Criteria for the Assignment and Categorisation of Classified Equipment into Safety Classes,
- ***Regulation of the SÚJB No. 184/1997 Coll.,*** on Radiation Protection Requirements,
- ***Regulation of the SÚJB No. 144/1997 Coll.,*** on Physical Protection of Nuclear Materials and Nuclear Facilities and their Classification.

An application for the nuclear installation construction license must be accompanied with the following documentation:

I. Preliminary Safety Analysis Report, the content of which shall include:

1. evidence that the proposed design meets all requirements for nuclear safety, radiation protection and emergency preparedness as laid down in an implementing regulations;
2. safety analyses and analyses of the potential unauthorised handling of nuclear

materials and ionising radiation sources, and an assessment of their consequences for personnel, public and environment;

3. information on predicted lifetime of nuclear installation or very significant ionising radiation source;
4. assessment of nuclear waste generation and management of it during commissioning and operation of the installation or workplace being licensed;
5. conception of safe termination of operation and decommissioning of the installation or workplace being licensed, including disposal of nuclear waste;
6. conception for spent nuclear fuel management;
7. assessment of quality assurance during preparation for construction, method of quality assurance for the carrying out of construction work and principles of quality assurance for linking stages;
8. list of classified equipment.

II. Proposed method of providing physical protection provision

The SÚJB will issue its construction license, after it has reviewed those documents and assessed them as satisfactory; the List of Selected Items and proposed physical protection method are subject to a separate approval by the SÚJB.

13.1.2 Nuclear power plant Dukovany

Basic principles observed in the design of a nuclear power plant, including application of the defence-in-depth strategy

Technological description of the nuclear power plant Dukovany units is given in Appendix 1.

The criteria and principles on which the original design was based were included into the Russian Contract design - ”Technical Substantiation of Safety”. The design criteria are here narrowed down to one basic nuclear safety criterion:

”NPP design shall protect operators and public from outer and inner irradiation and surrounding environment from contamination by radioactive substances within approved standards. This should be assured both during long-term stationary operation and anticipated accident conditions.”

Other criteria were there established only implicitly as references to technical norms and standards of the former USSR. These documents since 1974, when ”Technical Substantiation of Safety” was issued, became outdated, and before nuclear power plant Dukovany was put into operation, a number of new Czech and Russian standards has been published. Those new standards were taken into account while elaborating the Contract Design into the actual design of nuclear power plant Dukovany. The comparison of those binding regulations realised in a number of analyses for VVER-440/213 units in the beginning of nineties (see chapter 1 of this National Report) with the current regulations, permits us to conclude that the Czechoslovak legislation of eighties (and basically also the USSR regulations which underwent a similar

development) were at a very high level. Generally, they were conform to the contemporary understanding of nuclear safety, and their criteria, to a considerable extent, coincide with the current ones.

The Contract Design defined so called ”design basis accident” - double ended rupture on cold leg of the primary circuit (nominal diameter 500 mm) in the inseparable part of the reactor inlet.

The design also considers technical and organisational measures to assure nuclear safety in the event of a single failure of the normal operating equipment simultaneously with an undetected failure of other normal operating equipment. A loss of any of the independent active protection systems and one of the independent containment systems is also considered as simultaneous with a loss of the normal operating equipment. Damage to or failures of the normal operating equipment (systems), protection and containment systems which may lead to violation of the Limits and Conditions for normal operation, are in the design classified as accident conditions. The range of the considered primary events which may lead to an accident is in the design defined so that any possible single failure of the normal operating equipment may occur simultaneously with unrecognised long-term failure of other equipment (system), and that simultaneously with a loss or a failure of the normal operating equipment may occur a loss or failure of one independent active protection system (equipment) and one of independent active containment system (equipment). The safety analyses included into the Safety Analysis Report are performed for the defined set of initiating events.

The nuclear power plant Dukovany design respects the defence-in-depth concept defined in the IAEA INSAG-3. It is based on several protection levels which include the consecutive physical barriers preventing radioactivity release into the environment:

- Level 1 : A conservative design,
- Level 2 : Control of deviations from the normal operation and detection of failures,
- Level 3 : Safety systems and protection systems,
- Level 4 : On-site accident management, including containment system,
- Level 5 : Off-site emergency planning.

Probably most complex assessment of VVER-440/213 units, in the light of defence-in-depth implementation, has been performed within the IAEA programme in the period of 1992 - 1996 (see chapter 1 of this National Report). The programme was organised with the objective to identify deviations of the VVER-440/213 design from the current safety standards. Safety significance of the individual equipment (system) was assessed on the basis of its contribution to the defence-in-depth degradation.

Output document [1-5] of the programme comprised also recommendations for removal of established deviations.

From these general findings the nuclear power plant has selected those relevant to the Dukovany design and has prepared the programme for removing these deficiencies. Majority of the corrective measures, all with higher priority, has been already implemented. The special IAEA expert mission in 1996, commended progress of the implementation programme (see [1-6]).

Results of this assessment of the Dukovany design and successful implementation of the corrective measures programme are considered as a main evidence that the design and the construction of nuclear installation provide several reliable protection levels and protection approaches (defence-in-depth) against radioactivity release, for the prevention of accidents and mitigation of possible radiological consequences.

Human factor and man - machine interface related design features

Thirteen years of nuclear power plant Dukovany operation unequivocally proved that the design of this nuclear installation ensures its reliable, stable and easily controlled operation. Over the years, the plant underwent a number of modifications made with the objective to minimise possibility of a human factor error and to improve the man-machine interface, especially in the process control system. Additional modifications will be implemented after the year 2000 within the Modernisation Programme of the Nuclear Power Plant Dukovany (see chapter 1.1.2.2). These modifications are focused at the unit control room as well as at the simplification of regular performance tests of individual equipment. Some of the prepared modifications will increase the share of automatic control and thus - enable to reduce the number of necessary operator interventions and consequently to reduce number of potential human errors.

For a reliable and safe operation with emphasis on human factor and man-machine interface, both the design and the technical tools of the control room are very significant. The control room concept in VVER-440/213 units, in its Dukovany specific modification, provides:

- very clear view of the equipment conditions, which enables a fast and easy orientation of the control room personnel during normal operation as well as during transients. The original situation has been improved further by changes in the instruments ergonomy implemented as a result of the operators initiative,
- easy and fast equipment control from the control room,
- appropriate design of the failure and emergency warning systems which contributes to timely and correct identification of failures. Innovations implemented here had an emphasis on improvement of the man-machine interface,
- appropriate combination of analogue (classic) type of the control room with digital elements – computer based equipment was added gradually. More extensive computerisation improves the personnel's work efficiency and has a favourable effect on the man-machine interface and thus - limits errors due to "human factor". Some supporting computer programmes were installed which perform a number of calculations enabling to utilise a digitised documentation, etc.,
- in the communication area - the original design was supplemented by up-to-date telecommunication means. This improved significantly communication between the unit control room personnel and service personnel during the procedures controlled from the unit control room.

13.1.3 Nuclear power plant Temelín

Basic principles observed in the design of a nuclear power plant, including application of the defence-in-depth strategy

Technological description of the nuclear power plant Temelín units is given in Appendix 1.

At present, the design is complemented and modified so that both units in construction at the time of their commissioning will be fully equal, as to their level of nuclear safety assurance and operation reliability and other properties, to modern Western European and American Nucor power plants.

Proposed technical improvements resulted from the IAEA missions recommendations, results of the External Audit by NUS Halliburton (see [1-21]), their implementation will bring the 1st and 2nd units of Temelín plant into compliance with western standards requirements of the end of nineties.

Design changes were verified by new analyses performed with advanced western computer codes, both in depth and structure conform to the requirements of western standards.

To reach and to maintain the required level of nuclear safety, nuclear power plant Temelín is designed and will be operated so that in compliance with the generally valid regulations for nuclear safety assurance, it will fulfil the following principles and functions, it will be:

- capable of reactor safe shutdown and maintaining it in the conditions of safe shutdown under all in the design anticipated operating modes and events,,
- capable to remove the residual core heat under all in the design anticipated operating modes and events,
- capable to minimise any possible radioactivity leakage to the established limiting values under all in the design anticipated operating modes and events, as well as after them.

Observance of these general principles is achieved by adhering consistently to the defence-in-depth principles and by fulfilling safety functions. Personnel and environment of the nuclear power plant are protected against consequences of any serious accidents by physical barriers comprised of:

- the nuclear fuel matrix (practically all fission products are retained within matrix of the uranium dioxide pellets),
- the cladding of the fuel rods (fuel cladding is made of Zircaloy which remains hermetic over the whole time of utilisation and thus prevents the fission products release),
- the primary circuit (reactor pressure vessel and the primary circuit represent a barrier against pressure load, heat and radiation exposure),
- the containment - pre-stressed concrete dome (external 1.2 m thick containment covers the reactor and all important primary circuit equipment, and thus - prevents radioactivity releases into the environment in the event of a serious accident).

In 1996, special mission of the IAEA checked how the innovated design of nuclear power plant Temelín reacts to the IAEA safety issues, generic for nuclear power plants with VVER-1000 reactors described in the IAEA document [1-19]. Individual safety issues were, similarly as in the case of units with VVER/440-213 type reactors, categorised from the aspect of their importance for nuclear safety. The mission evaluated the state of implementation of the

recommended earlier modifications and of the preparation for operation, including the issue of the design compatibility (implementation of western technology into the original design). The mission recognised a general improvement of the Temelín design and emphasised that the combination of eastern and western technology was considered with a great care. In some cases, combination of eastern and western technology lead to a safety improvement, when compared with international practice. Such positive evaluation, besides other, confirms that the design of nuclear power plant Temelín is conform to the defence-in-depth concept.

13.2 Statement on implementation of the obligation concerning Article 18

The legislation valid in the Czech Republic and its implementation into the practice, satisfy requirements of Article 18 of the Convention. The operated nuclear power plant Dukovany and constructed nuclear power plant Temelín are designed with the features of the defence-in-depth concept - to prevent accidents, and if this fails - to mitigate their potential radiological consequences. Applied technologies are either well proven or verified by the tests combined with computational analyses.

14. Operation - Article 19 of the Convention

Each Contracting Party shall take appropriate steps to ensure:

(i) the initial authorisation to operate a nuclear installation is based upon an appropriate safety analysis and a commissioning programme demonstrating that the installation, as constructed, is consistent with design and safety requirements;

(ii) operational limits and conditions derived from the safety analysis, tests and operational experience are defined and revised as necessary for identifying safe boundaries for operation;

(iii) operation, maintenance inspection and testing of a nuclear installation are conducted in accordance with approved procedures;

(iv) procedures are established for responding to anticipated operational occurrences and to accidents;

(v) necessary engineering and technical support in all safety-related fields is available throughout the lifetime of a nuclear installation;

(vi) incidents significant to safety are reported in a timely manner by the holder of relevant license to the regulatory body;

(vii) programmes to collect and analyse operating experience are established, the results obtained and the conclusions drawn are acted upon and that existing mechanisms are used to share important experience with international bodies and with other operating organisations and regulatory bodies;

(viii) the generation of radioactive waste resulting from the operation of a nuclear installation is kept to the minimum practicable for the process concerned both in activity and in volume, and in necessary treatment and storage of spent fuel and waste directly related to the operation and on the same site as that of the nuclear installation take into consideration conditioning and disposal.

14.1 Description of the current situation

14.1.1 Description of licensing process, including summary of national legislation

The so called ”licensing process” has been described in general - for siting, designing and construction, operation and decommissioning of nuclear installations in chapter 2.1.2 of this National Report. As it was said in chapter 3.1.2, commissioning and operation of a nuclear installation are the practices for which under the Atomic Act (Article 9, para 1, letter c) and d)) the SÚJB licence is required which considers the issues of nuclear safety and protection against ionising radiation. According to Article 13, para 5 prerequisite for the issue of such licence is an approval of a quality assurance programme for the licensed practice.

The legislative framework governing the issue of a construction license which covers the nuclear safety and radiation protection aspects, is established by the Atomic Act and its implementing regulations, in particular:

- ***Regulation of the SÚJB No. 106/1997 Coll.,*** on Nuclear Safety and Radiation Protection Assurance during Commissioning and Operation of Nuclear Facilities,
- ***Regulation of the SÚJB No. 214/1997 Coll.,*** on Quality Assurance in Activities Related to the Utilisation of Nuclear Energy and in Radiation Practises, and Laying Down Criteria for the Assignment and Categorisation of Classified Equipment into Safety Classes,

- ***Regulation of the SÚJB No. 184/1997 Coll.,*** on Radiation Protection Requirements,
- ***Regulation of the SÚJB No. 144/1997 Coll.,*** on Physical Protection of Nuclear Materials and Nuclear Facilities and their Classification.

Commissioning

An application for the issue of a licence for the individual stages of nuclear installation commissioning must be, in accordance with Appendix C of the Atomic Act, accompanied with the following documentation:

a) For stages prior to loading nuclear fuel into a reactor

1. time schedule for work in a given stage;
2. programme for the stage in question;
3. evidence that installation and personnel are prepared for the stage in question;
4. evaluation of results of the preceding stage;
5. method by which physical protection is to be provided.

b) For the first loading of nuclear fuel into a reactor

I. pre-operational safety report which shall include:

1. description of changes to original design assessed in the preliminary safety report and evidence that there has been no decrease in the level of nuclear safety of the nuclear installation;
2. supplementary and more precise evidence of nuclear safety and radiation protection provisions;
3. limits and conditions for safe operation of the nuclear installation;
4. neutron-physics characteristics of the nuclear reactor;
5. method of radioactive waste management;
6. quality evaluation of classified equipment;

II. further documentation which shall include

1. evidence that all prior decisions and conditions of the Office were fulfilled;
2. time schedule for nuclear fuel loading;
3. programme for nuclear fuel loading;
4. evidence that installation and personnel are prepared for nuclear fuel loading;
5. evaluation of the result of previous stages;
6. on-site emergency plan;
7. changes in the provision of physical protection;

8. programme of operational inspections;
9. proposed decommissioning method;
10. cost estimate for decommissioning as in II.9, verified by the Authority.

c) For stages following the first nuclear fuel loading into the reactor

1. time schedule for work in this stage;
2. programme of this stage;
3. evidence that installation and personnel are prepared for the stage in question;
4. evaluation of results of the previous stage.

The SÚJB issues its construction licence, after it has reviewed those documents and assessed them as satisfactory; the individual stages programmes, proposed physical protection method, changes in the provision of physical protection, proposed decommissioning method, on-site emergency plan, programmes of in-service inspections, as well the Limits and Conditions for safe operation, are subject to a separate approval by the SÚJB.

Operation

An application for the issue of a licence for operation of nuclear installation operation must be, in accordance with Appendix D to the Atomic Act, accompanied with the following documentation:

1. supplements to the pre-operational safety report and further supplements to documentation required for the issue of a licence for the first nuclear fuel loading into the reactor, relating to changes carried out after the first nuclear fuel loading;
2. evaluation of results of previous commissioning stages;
3. evidence of implementation of previous decisions and conditions of the Office;
4. evidence that installation and personnel are prepared for operation;
5. operation time schedule;
6. up-dated limits and conditions for safe operation.

The SÚJB issues its operation licence, after it has reviewed those documents and assessed them as satisfactory; changes in the documentation which has bee approved within the previous stages, are subject to a separate approval by the SÚJB.

Although the operation licence under the Act is not time-limited, during operation the SÚJB issues licenses for restart of a nuclear reactor to criticality following a nuclear fuel reload, based on review of the documentation submitted in accordance with Appendix E to the Atomic Act, i.e.:

1. neutron-physics characteristics of the reactor;

2. evidence that installation and personnel are prepared for restart of the nuclear reactor to criticality, including preliminary evaluation of in-service inspections;
3. time schedule for subsequent operation.

The following paragraphs describe the situation at nuclear power plant Dukovany which in the only nuclear power plant in operation in the Czech Republic.

14.1.2 Limits and Conditions for safe operation

Concept of the Limits and Conditions for safe operation has been formulated as early as 1982 following an initiative of the ČSKAE and on the basis of the US NRC reference guide [1-14] for nuclear power plants with pressurised water reactors. The first version of the Limits and Conditions for nuclear power plant Dukovany was put into use in 1983 as a first application for VVER reactors. Since then, the Limits and Conditions have been systematically developed and more precisely specified.

The Limits and Conditions for safe operation contain a set of data on:
- allowable parameters,
- requirements to equipment performance,
- protection systems settings,
- basic assumptions and operations of personnel during defined operating conditions and organisational measures.

They include the following categories of data:
- safety limits,
- protection systems settings,
- limits and conditions for the normal operation modes,
- requirements for checks.

The Limits and Conditions for safe operation are based on computational and experimental analyses data, as well as on the operating experience acquired not only at Dukovany VVER-440/213 units but at similar units of other countries (the Slovak Republic, Hungary, Russia). The Limits and Conditions are closely related to the operating procedures for operation and maintenance of the individual systems and equipment as well as to accident analyses in the Safety Analysis Reports. The Limits and Conditions underwent also a re-evaluation grounded on the results of probabilistic safety assessment.

In the event of any deviation from the Limits and Conditions, responsible persons shall take immediate measures to restore the compliance as soon as possible. If the compliance can not be restored and possible consequences of the deviation are important for nuclear safety, the reactor must be shut down and cooled. Analysis of the deviation from the Limits and Conditions follows, measures preventing its repetition are proposed, the deviation is reported to the Regulatory Body - in accordance with the established by the SÚJB principles.

The Limits and Conditions are modified according to science and technology development, implemented modernisation of the nuclear power plant and the experience acquired.

The Limits and Conditions, in the original Czech legislation and in the new Atomic Act, are demanded as one of the basic documents for the issue a license for the first loading of nuclear fuel into a reactor, and their up-dated version - for the nuclear installation operation licence.

14.1.3 Operation, maintenance, inspections and tests of nuclear installation

The Dukovany units are operated in compliance with internal regulations and the Limits and Conditions for safe operation. These documents are continuously and systematically updated and upgraded. The compliance is monitored through the implemented control system and so called system of ”feed-back”.

The basic system norm which establishes principles for safe and reliable operation, are Operation Control Rules [14-2]. The Rules are formulated so that their observance shall ensure safe, reliable and economic and environmentally friendly operation of the nuclear installation, conform to:

- conditions of the SÚJB licence,
- provisions of the binding legal regulations of the Czech Republic (acts and their implementing regulations),
- operating procedures.

Operation of nuclear power plant Dukovany is managed by the Operations Section. The division of responsibilities is defined in the corresponding quality assurance programmes.

Special emphasis is put on preparedness and competence of operating personnel, especially so called ”selected personnel”, i.e. personnel who have an immediate effect on nuclear safety (see chapter 6 of this National report). Also other operating personnel similarly undergo selection, training and hands-on training for the relevant function. High competence of the operating personnel is documented, besides other, by the very good statistics of human factor influence.

Shift operation at nuclear power plant Dukovany is ensured by six, or seven - in the case of selected personnel, equally competent shifts, which provides for the operation as well as for periodic training and proper rest of the personnel.

Maintenance

Maintenance of nuclear power plant Dukovany provides and controls all relevant activities on plant equipment so that they are:

- in accordance with the plant design,
- in accordance with the Czech Republic legislation,
- in accordance with international recommendations,
- in accordance with the internal documents,

and, at the same time, the following is assured:

- nuclear, radiation and conventional safety,
- required reliability,
- limits and conditions of safe operation,

- design lifetime of the equipment
- the covering financial means the spent effectively and optimally.

This is done with respect to optimal and effective spending of financial resources.

The main goal of maintenance is to ensure required availability of the plant technological equipment, timely removal of defects, their documenting and performance monitoring.

The equipment maintenance is carried out in accordance with the prescribed maintenance programme for individual equipment, and its method and range depend on the equipment categorisation.

The maintenance scope and financing is at nuclear power plant Dukovany planned in the whole range from 5 years maintenance plans up to daily maintenance.

Inspections and tests

In the course of the unit operation and during regular reloading outages, operating personnel performs regular tests of the equipment. Extent of the tests and their periodicity is given by the Limits and Condition for safe operation and the Operating Procedures. These documents provide annual time schedules of the tests. For each test are prepared methods and procedures to which the operating personnel strictly adheres. Tests are carried out, according to their character, either by the competent operating personnel only or by the competent operating personnel in co-operation with the corresponding plant experts of the appropriate profession. Each test is documented in the record or report.

Detected deficiencies of different significance are removed in accordance with a system which is described in the internal plant regulations. Those are formulated so that requirements of the Limits and Conditions for safe operation and/or Operating Procedures are always fulfilled. Observance of the deadlines, actual performance and evaluation of the tests is controlled by independent control workers and by a responsible superior.

14.1.4 Intervention procedures for the anticipated operational events and accidents

Emergency procedure

Activities carried out by the shift personnel and the unit control room personnel are established in the operating procedures. For the case of failure or accident there is up to now in use co called “Failure Elimination Procedure” [14-3]. This procedure establishes activities of the operating and unit control room personnel in the event of a failure or the unit’ s accident.

New Emergency Operating Procedure [14-4] has been developed and will in 1999 become valid. This procedure is symptom-oriented and was prepared in accordance with the Westinghouse method and in co-operation with this company. Development of the general guidelines by Westinghouse, started upon the US NRC initiative, is dated back, after the Three Mile Island accident, these guidelines are permanently updated and made more accurate. A special study confirmed that the Westinghouse procedures are applicable to

nuclear power plants with VVER reactors without any significant changes of technology or instrumentation. The only addition was a set of recommendations prepared by the experts, which facilitates application of the individual parts of the procedure. A major part of these recommendations is identical with the PSA study conclusions, conclusions of OSART, ASSET and other international missions as well as with the SÚJB recommendations. The Emergency Procedure is composed of 45 individual procedures. New Procedure deals with an accident according to its symptoms, i.e. independent on events themselves. Monitoring of the critical safety functions is an integral part of new Procedure. Compared with the preceding Procedure, the new one covers a significantly wider range of accidents. Accidents are always dealt with up to so called safe state, i.e. up to the state of conditions when a nuclear unit is fully under the operator's control, and cooling to the cold condition has been started in accordance with normal operating procedure. The whole Procedure is written in a two column format, using successive steps method. The left hand column contains the anticipated course or anticipated response of an equipment, the right hand one - one or several alternative solutions. Formally, this Procedure is issued similarly as all other operation documentation of nuclear power plant Dukovany. Each procedure is supplemented with the necessary appendices and graphs.

The Procedure was developed by experts with many years of operating practice. Individual stages of the new Emergency Procedure development were subjected to verification by both Westinghouse and units control rooms personnel. A study of the human factor response in the application of the Procedure has been performed. At present, the Procedure validation is nearing the end, the validation results are included into the Procedure's final version.

The Emergency Operating Procedure will be up-dated using comments arising during regular training and especially - within the long-term Westinghouse contract. Annual meetings of the Procedure authors will serve to discuss all significant changes in the technology of nuclear power plant Dukovany and the consequent necessary changes in the Emergency Operating Procedure. At the same time, Westinghouse will acquaint Dukovany personnel with the revisions of the general guidelines for the development of Emergency operating procedures.

Development of the new Procedure has been documented, as well as all changes and comments made in the course of verification, validation and training.

The Emergency Operating Procedure is accompanied with extensive supplementing documentation (its integral part) composed of two basic parts:

- first - which includes brief descriptions of the partial procedure purpose, explanation of the particular accident's transient without operator intervention and then - with corrective operator interventions. It also summarises the strategy of basic operator's interventions and briefly explains them,
- second, more comprehensive part, includes a detailed explanation of each partial step of the Procedure, of each warning and note, including instrumentation and controls involved. The description comprises a separate chapter with all values of the parameters used. Each value used is supported by a computation or by a reference to the plant design documentation.

The Procedure is also accompanied with a list of the reference analyses which served as an input for the development of the Procedure and a list of analyses which were used for the procedures validation.

In connection with the implementation of the Emergency Operating procedure it became necessary to revise the currently valid Eemergency Instruction. New instruction is under preparation, it will be implemented in 1999 at the same time as the Emergency Operating Procedure.

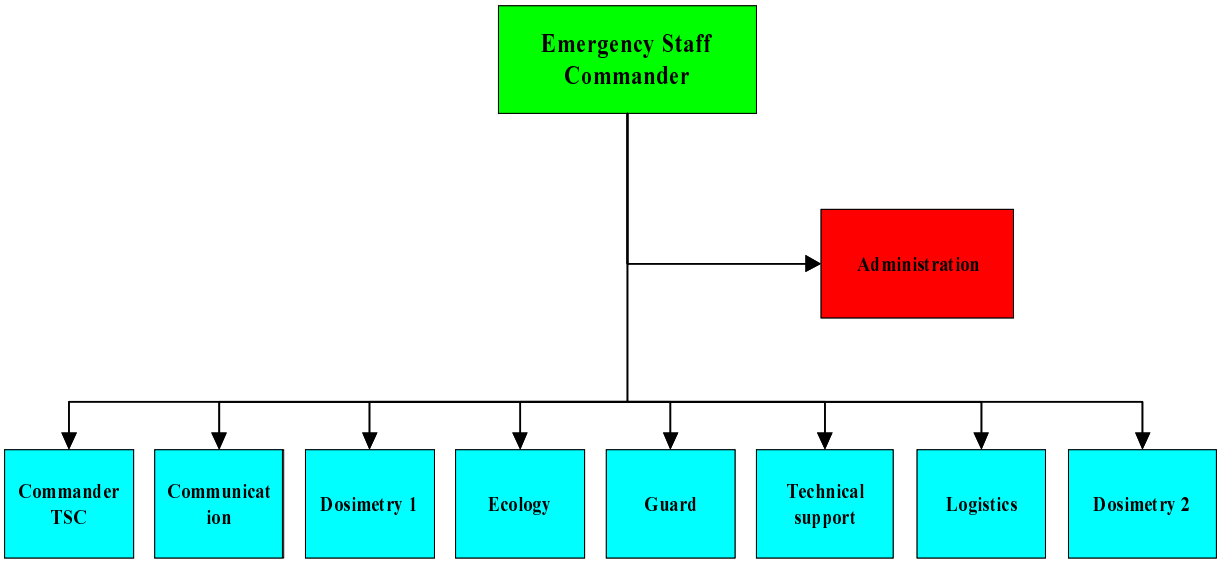
Since 1994, all Dukovany operating documentation is being revised. The Operating Procedures are divided into two parts: operating - used by operators in the process control, and descriptions - used principally for the training purposes which, besides a detailed description of the equipment, contain description of the operating states, design values and other necessary data. All new documents are formally unified. Databases of signals, protections and blocks, valves, drives, etc. are being loaded in parallel with the documents revision. New system of the databases provides for a better updating of the documents and is an important initial step for the preparation of the plant extensive modernisation.

Training of the control room operators is carried out as two a week long exercises at the Trnava simulator (the Slovak Republic). The training plan is updated annually in accordance with the operating requirements, so that in a two year cycle each control room operating team goes through all serious and anticipated accidents. Since mid 1997, operators during two days of a week's training exercise in accordance with the Emergency Operating Procedure.

Shift emergency staff

The plant Director has appointed the shift emergency staff, continuously in readiness, which shall manage all activities and work connected with clean-up of any extraordinary events and their consequences. The shift emergency staff is instituted as a top control body within the on-site emergency organisation which in the event of an extraordinary event ensures fulfilment of the preventive and repressive tasks for protection of health, lives and property. The staff operates in 4-shift uninterrupted cycles which provides for its fast accessibility and readiness necessary for the emergency organisation management and in the event of long-lasting emergency event of 2nd and 3rd degree, with the task - to manage activities and work connected with clean-up of extraordinary events and their consequences. During the whole duration of an extraordinary event and clean-up, the shift emergency staff becomes, after its activation, the principal managing unit which takes over the accident management responsibility. It issues recommendations for the shift engineer and unit control room personnel, grounded on available data and information, own experience and computer-based prediction of the accident development.

Shift emergency staff is composed of 10 members who perform the following functions:



Head of the shift emergency staff co-ordinates activities of all subordinated functions or units, controls their activities, approves all decisions and reports sent to other on-site emergency preparedness bodies and off-site emergency preparedness bodies, etc.

The shift emergency staff workplace in the shelter below the administration building is equipped to ensure protection of the personnel against effects of ionising radiation and to provide technical tools necessary for performance of the shift emergency staff tasks, it is maintained in the state of permanent readiness.

14.1.5 Engineering and technical support

Nuclear power plant Dukovany has Engineering and Technical Support Centre, which fulfils the following objectives:

- provides support for operating departments in ensuring adequate technical level of the process equipment reliability in accordance with the current design,
- establishes a new technical level of the equipment reliability and safety, to match new scientific and technical achievements, as well as to comply with requirements of State regulatory bodies and international recommendations.

The technical support is provided by highly educated personnel qualified for the specific task they perform themselves or which they supervise.

The Dukovany technical policy is discussed in the Technical Committee chaired by Vice-Director for Technology.

External technical support for nuclear power plant is coming from research institutes, faculties of universities and some suppliers of engineering services. A significant share of such support provides Nuclear Research Institute Řež.

14.1.6 Operational lessons learned approach

Since the beginning of its commercial operation in 1985, nuclear power plant Dukovany applies system which permits to benefit from its own operating experience. Since 1991 it was complemented to comprise experience acquired at power plants outside the Czech Republic, available from WANO network. The whole process which includes examination of the causes of operational events, remedial measures and feed-back, is described in a special instruction.

Each event is recorded in accordance with the criteria established by this instruction; for safety related events the instruction also provides criteria in accordance with which an event is reported to the SÚJB or other relevant bodies or organisations (ČEZ headquarters, sanitary service, fire brigade, etc.). The events are evaluated according to the INES international scale. A special department of the Nuclear Safety section - events investigation - is responsible for the event-related investigation, it also co-ordinates the whole process of investigation into the causes of operational events, in which also other plant specialists logically participate.

Operational events at nuclear power plant Dukovany

The plant Failure Commission at its regular sittings confirms completeness of the investigations into causes of safety related events (0 or higher on INES scale) and takes measure to remove them.

The significant events are discussed also by Technical and Safety Commission in the presence of plant top management.

The corrective measures are recorded in the special programme and personnel of the plant nuclear section checks their implementation by the established deadline.

After the process of investigation is completed, the particular event data are coded into SIS programme which is a part of the plant computer network. This makes all important data and experience available and usable to improve the plant reliability. Programme SIS contains operational events data since 1985.

Selected events which occurred at the plant and abroad are discussed during the plant personnel training.

Under the law and according to an approved procedure, the SÚJB takes part in this process.

External events

Lessons learned approach (events at foreign power plants) is implemented by the Technical Development Department of the Engineering Service Centre (see chapter 14.1.5 of this

National Report). The Centre itself has two workers, however the whole system involves also other personnel, especially those who take part in the internal events investigation. A main objective of the system is to transfer and to utilise at nuclear power plant Dukovany any operating experience and technical information acquired by nuclear power plant Operators. Information selected from WANO, INPO and IAEA sources is included into agenda of the Failure Committee. All information obtained is archived in database form (required software tools are available), and used as a technical support in resolving plant's problems. The system is described in a special instruction and comprises five basic programmes:

- operational events reports,
- direct information exchange between operators,
- operating parameters WANO, PRIS,
- good practice,
- partners inspections.

14.1.7 Notification of events important for nuclear safety

Article 17, para 1, letter c) of the Atomic Act establishes as one of the licensee obligations:

"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"

Thus, reports of important events to the Regulatory Body is one of the basic obligations of a nuclear installation operator. Such information transfer comprises non-nominal states, in relation to nuclear safety and radiation protection, emergency situations and also activities which affect nuclear safety and radiation protection. The reporting procedures are described in the plant internal documents. The principle document which establishes both the obligation and method of communication with the Regulatory Body is the system norm "Nuclear Safety Rules". The linked-up guidelines give details of frequency of the information transfer, manner of transfer and departments responsible for the preparation of the information to be transferred.

The Regulatory Body receives it daily, in working days, and is informed on the operating states in the course of regular meetings. Nuclear power plant Dukovany had for this purpose introduced a special journal for recording contacts between operator and local safety inspectors. Inspectors have a right of access to the computer network which enables them to monitor activities planned for each particular day.

14.1.8 Optimisation of waste

Basic objective

The basic objective of radioactive waste management is their isolation from the environment. Radioactive waste generated as a result of Dukovany normal operation is, with exception of high-level waste (spent fuel, components of reactor internals), after the appropriate treatment, stored within the plant site. With respect to the ecological and economic conditions of nuclear power plant Dukovany, radioactive waste storage in this storage facility represents an optimal option which fulfils the basic objective - its isolation from the environment, until its radioactivity is significantly reduced as a result of decay. Storage in the storage facility is conditional on the radioactive waste being processed and transformed into a suitable form.

Minimisation principle

An important principle of the radioactive waste management is minimisation of their amount. Minimisation is a process which leads to a minimum possible volume of processed wastes to be stored in the storage facility. This process begins with the technological equipment and their modifications, continues in the operating procedures and their observance and ends at the reduction factor characterising the treatment and actual configuration of stored barrels (space utilisation). Minimisation may be also understood as an effort to reduce, as much as possible, the stored waste mass. Reduction of waste volumes brings ecological and economic benefits.

At nuclear power plant Dukovany, currently implemented methods are aimed at further reduction of the radioactive waste generation:

- development and implementation of low-waste decontamination technologies, with emphasis on the limitation of the amount of salts (water is recycled),
- implementation of an effective technology for final decontamination of metals (amounts of processed decontamination solutions must not exceed the volume of metals saved for the recycling),
- limiting unnecessary decontamination - on the qualified estimate basis,
- optimisation and unification of tensides used in the controlled area - to minimise foaming at evaporators,
- limiting number of unnecessary objects brought into the controlled area,
- limiting unnecessary entries of persons,
- using thinner (lighter) PE sheets applied as protection against contamination,
- using optimal concentrations of drained media,
- replacing of service water with condensate or demineralised water there where leakage occur (reduction of salts amount in radioactive concentrates).

Nuclear power plant Dukovany categorises its technological wastes as follows:

No.	Category	Waste characteristics	Source
1	pressable-combustible	discarded personal protection aids, decontamination and cleaning cloth, packaging materials, paper, PE sheets	major share of this waste is produced during revisions and repairs of an unit
2	Non-combustible	glass, wire, tins, cuttings, ceramics, filters	Largely during revisions and repairs
3	Wood	wooden transport crates, pallets, scaffolding floors	Incidental, especially during replacement of air-conditioning filters
4	Burnable-unsuitable for combustion	PVC, PTFE (teflon)- sheets, sealing materials	Materials formerly much in use within controlled area
5	Bulky metal objects	structure materials made of carbon or stainless steel	major reconstructions
6	Ionexes	discarded fillings of purifying stations	regular replacement of materials, incidental leaks during technological operations
7	Other sorbents	activator charcoal, vapex, zeolites	regular replacement of materials, incidental leaks during technological operations
8	Sludges	sediments in tanks, mixture of organic and inorganic masses of non-standard composition	rinsing and cleaning of floors, dust produced at materials cutting and abrasing, non-design crystallisation
9	Waste water	as a rule, diluted solutions of inorganic compounds with impurities	uncontrolled leakages, fore-runs, sampling, laboratory water
10	Oils and solvents	deteriorated lubricants, remnants of solvents and scintillators	replacement of laboratory fillings, discarding of unusable and contaminated liquids
11	Gases	air-mixture containing radioactive aerosols and gases	releases from equipment conditioned radioactive fluids

These radioactive wastes are disposed as follows:

No	Category	Main technology of treatment
1	Pressable-combustible	high-pressure compacting
2	Non-combustible	high-pressure compacting
3	Wood	high-pressure compacting
4	Burnable- unsuitable for combustion	high-pressure compacting
5	Bulky metal objects	disposal at storage facility without preceding decontamination and recycling
6	Ionexes	safe storage
7	Other sorbents	safe storage
8	Sludges	safe storage
9	Waste water	bitumination of concentrates
10	Oils and solvents	combustion
11	Gases	filtration

Spent nuclear fuel

Spent nuclear fuel is stored for 6 years in at-reactor storage pool, after that it is transferred into Castor 440/84 casks. Each cask contains a maximum of 84 spent fuel assemblies. Casks are stored at the Intermediate Spent Fuel Storage Facility with current capacity of 60 such casks.

Radioactive waste storage facility

The Regional Radioactive Waste Storage facility at Dukovany site is designed to allow disposal of the processed low-level and medium-level short-lived radioactive wastes from Czech nuclear power plants. Waste is stored in a solid, stabilised form, isolated from the environment and in accordance with the approved Limits and Conditions.

14.2 Statement on implementation of the obligation concerning Article 19

It follows that the legislative requirements imposed in the Czech Republic on commissioning of a nuclear installation, its operation and performance of related activities are conform to the requirements of Article 19 of the Convention.