Czech Republic

National Report

under the

Convention on Nuclear Safety

Revision 2004

Table of Contents

Introduction

This Report is the National Report of the Czech Republic prepared for the purposes of a review by the parties to the Convention on Nuclear Safety. This Report has been elaborated with the objective to describe fulfillment of obligations arising from the Convention by the Czech Republic by June 30, 2004. The structure of the Report is based on 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".

By the above-mentioned date the Czech Republic had two operating nuclear installations covered by the Convention on Nuclear Safety – both operated by the ČEZ, a. s. company:

Dukovany Nuclear Power Plant (Dukovany NPP) with four reactor units of VVER 440/213 type. The units were commissioned in the following years:
Unit 1 - 1985,
Unit 2 - 1986,
Unit 3 - 1987,
Unit 4 - 1987.

and

Temelín Nuclear Power Plant (Temelín NPP) with two reactor units VVER 1000/320. Both units are in the trial operation stage.

The National Report reports on the state of implementation of individual Articles of the Convention and considers only the two above-mentioned nuclear installations.

Nevertheless, the basic philosophy and principles of nuclear safety assurance applied to these two nuclear power plants have been correspondingly applied also to the 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 to evaluation under the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.

Above and beyond obligations arising from the Convention on Nuclear Safety, information on research reactors is included in the Annex 8.

List of Abbreviations

ADR	European Agreement Concerning the Carriage of Dangerous Goods
ALARA	As low as reasonably achievable
ANS	American Nuclear Society
ANSI	American Nuclear Standard Institute
AOP	Abnormal Operating Procedure
AOT	Allowed outage time
AQG	Atomic question group
ASSET	Assessment of Safety Significant Events Team
Atomic Act	Act No. 18/1997 Coll., on Peaceful Utilization of Nuclear Energy and Ionizing Radiation (the Atomic Act), as amended
AZ	Reactor core
BCEQ	Condenser Experimental Qualification
BI	Safety engineer
BOZP	Industrial Safety
BRS	National Security Board
CDF	Core Degradation Frequency
CTP	Technical Support Center
ČEZ, a. s.	Business name of the Czech utility - joint stock company ČEZ, a. s.
ČEZ-EDU	ČEZ, a. s., Dukovany Nuclear Power Plant
ČEZ-ETE	ČEZ, a. s., Temelín Nuclear Power Plant
ČHMÚ	Czech Institute for Hydrometeorology
ČSFR	Czech and Slovak Federal Republic
ČSKAE	Czech Commission for the Atomic Energy
ČSSR	Czechoslovak Socialist Republic
ČÚBP	Czech Institute for Labor Safety
DECREE	a legal regulation issued by the Ministry or the central state administration body by its authority included in the relevant Act
EGP	Energoprojekt Praha
EOP	Emergency Operation Procedure
HP	Emergency preparedness
HŠ	Emergency Headquarters
HPES	Human Performance Evaluation System
HZS	Rescue Fire Brigade
HZSp	Rescue Fire Brigade of the plant
ICAO	International Civil Aviation Organization
ICRP	International Commission for Radiation Protection
INES	International Nuclear Event Scale
INEX	International Exercise
INPO	Institute of Nuclear Power Operators
INSAG	International Nuclear Safety Advisory Group
IPERS	International Peer Review Service
IRRT	International Regulatory Review Team
IRS	Incident Reporting System

ISO	International Standard Organization
ITI	Institute of Technical Inspections
JE Dukovany	Dukovany NPP
JE Temelín	Temelín NPP
KI	Potassium iodide
KKC	Emergency Coordination Center
KP	Controlled zone
KŠ	Emergency Headquarters
LaP	Limits and Conditions
LBB	Leak Before Break
LERF	Large Early Release Frequency
LRKO	Laboratory for Monitoring of Environment Radiation
IAEA	International Atomic Energy Agency
MPO	Ministry of the Industry and Trade of the Czech Republic
MSK-64	Medvedev Sponheuer Karnik (seismic intensity scale)
MSVP	Interim Spent Fuel Storage
MÚ	Extraordinary event
NATO	North Atlantic Treaty Organization
NPD	Nuclear Power Division of ČEZ a. s.
NUREG	Nuclear Regulation
NUSS	Nuclear Safety Series
OECD-NEA	Organization for Economic Cooperation and Development / Nuclear Energy Agency
OED	Operator of the Electrical Output Control Room
OHO	Emergency Response Organization
OPIS	Operations and Information Center
OSART	Operational Safety Review Team
PHARE	Technical Assistance Program organized by the European Commission
PLIM	Plant Life Management
PO	Fire protection
POO	Sub-committee for population protection
PpBZ	Pre-operational (Final) Safety Report
PS	Working group
PRIS	Power Reactor Information System
PSA	Probabilistic Safety Assessment
PSCO	Civil defense working group
PWR	Pressurized water reactor
PZJ	Quality Assurance Program
QARAT	Quality Assurance Review Assistance Team
RMS	Radiation Monitoring Network
RÚ CO	Regional Office of Civil Defense
SAMG	Severe Accident Management Guidelines
SAS	Safety Advisory System
SI	Shift engineer
SPSA	Shutdown Probabilistic Safety Assessment
sHŠ	Shift Emergency Headquarters
SSSR	Union of the Soviet Socialist Republics
SÚJB	State Office for Nuclear Safety
SÚJCHB	National Nuclear, Chemical and Biological Institute

SÚRAO	Radioactive Waste Repository Authority
SÚRO	State Institute for Radiation Protection
ŠVS	Education and Training Center
SW	Software
TLD	Thermo luminescence dosimeter
TPS	Technical Advisory Group
ÚJV Řež a. s.	Nuclear Research Institute in Řež u Prahy
ÚKŠ	Central Emergency Headquarters
US NRC	US Nuclear Regulatory Commission
VCNP	Committee for Civil Emergency Planning
VÚJE	Research Institute for Nuclear Power Plants (Slovakia)
VVER (or WWER)	Type identification for pressurized water reactors designed in the former Soviet Union
WANO	World Association of Nuclear Operators
WDPF	Westinghouse Distributed Processing Family
WENRA	Western Nuclear Regulatory Association
WPNS	Working Party on Nuclear Safety
ZHP	Emergency planning zone

1. Existing nuclear installations - Article 6 of the Convention

Each contracting party shall take appropriate steps to ensure that the safety of nuclear installations at the time the Convention enters into force for that contracting party is reviewed as soon as possible. When necessary in respect to the Convention, the contracting party shall ensure that all reasonably practicable improvements are urgently made to upgrade the safety of the nuclear installation. If such upgrading cannot be achieved, plans should be outlined to shut down the nuclear installation as soon as practically possible. The timing of the shutdown may take into account the general situation in energy production and potential alternatives, as well as the social, environmental and economic consequences.

1.1 Description of the current situation

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

At present there are four VVER-440/213 reactor units in Dukovany NPP and two VVER 1000/320 reactor units in Temelín NPP operated in the Czech Republic. Geographic locations of both the Czech nuclear power plants are shown in Fig. 1-1. Technical data of both NPPs and main hitherto changes in their designs can be found in the Annex 1 of this National Report.

1.1.2 Dukovany NPP

1.1.2.1 Overview of nuclear safety assessments performed and their main conclusions

Evaluation of the nuclear safety assurance level at Dukovany NPP has been under way practically since the very beginning of its construction in 1976. First analyses after the units were put into operation, and especially analyses performed in response to the Chernobyl accident, resulted in the so-called "Back-fitting of Dukovany Nuclear Power Plant" project.

Since the early 1990s, major attention has been paid to the nuclear safety reassessment of units with VVER 440/213 reactors, which is done through analyses, application of support programs and evaluations performed within various international activities. These efforts include in particular:

- assessment of conclusions from OSART and ASSET missions, assessment of safety findings, IPERS
- supporting analyses performed within international technical cooperation projects
- exchange of experience from operation within WANO
- common activities by operators of units with VVER 440/213 reactors
- technical audit (internal, external)
- safety assessment of Dukovany NPP units after 10 years of operation
- assessment by insurance pools
- assessment by WENRA
- periodic safety assessment
- probabilistic safety assessment

The following text briefly describes the goals, scope and main results of the performed assessments. Results of the assessments have been translated into short-term or medium-term

measures or, long-term prospective, they have been used as input data for the extensive project called "Modernization Program for Dukovany NPP".

IAEA mission

In 1989-1999 the IAEA performed, at the request of the Czech government, a number of missions at Dukovany NPP in order to evaluate the general level of nuclear safety at its units (OSART, ASSET), as well as to address specific technical and analytical issues associated with nuclear safety (evaluation of safety findings at VVER-440/213, IPERS).

The first OSART mission took place in September 1989 followed by a re-assessment Re-OSART mission in November 1991. The purpose of the missions was to complement assessment of the nuclear power plant with an evaluation of maintenance control, implementation and a subsequently check on the implementation of potential corrective measures. The conclusions from both the missions at Dukovany NPP were favorable and additional proposals were appended to the final report for further improvement of nuclear safety provision and gradually implemented [1-1], [1-2].

Another OSART mission took place in 2001. The power plant control areas, personnel quality, equipment and order condition were evaluated at a high standard, and the working procedures and regulations area was evaluated at an average. Fulfillment of the Recommendations and proposals resulting from this mission was checked by the Follow-up OSART mission in 2003. The mission team found that Dukovany NPP personnel performed an exhaustive analysis and its solution of operational safety enhancement exceeded in many cases the extent of original team recommendations. In respect to solution of findings included in the original report, the power plant made great progress and the team classified many of these findings as fulfilled [1-3].

The ASSET mission took place in October 1993 in order to verify the event prevention system, i.e. the so-called "operational events feedback". The mission was followed by another ASSET mission in 1996 to evaluate the event prevention system based on the plant's self-assessment. Conclusions from both missions ranked very favorably the standard of nuclear safety provision at the plant [1-4], [1-5].

A mission evaluating safety findings was organized in 1996 in order to assess specific design solutions of the Dukovany NPP units in connection with safety recommendations identified by the IAEA in general for VVER-440/213 units in 1994-1995. The mission appreciated the approach of Dukovany NPP to the implementation of safety recommendations. The date for the IAEA Follow-up mission evaluating safety findings has not been set yet [1-6], [1-7].

The IPERS mission took place in 1998, focusing on PSA first level study, in order to evaluate the analysis and propose specific recommendations to improve it. The final report contained 57 recommendations. All recommendations were analyzed in detail in the course of next three years and adopted recommendations were included into the PSA model and documents.

Supporting analyses performed within international projects of technical cooperation

After 1990 Dukovany NPP took advantage of offered international technical cooperation projects organized by the IAEA, the European Union, the OECD-NEA or by individual countries based on bilateral agreements. A number of safety analyses were performed within these projects, e.g. evaluation of piping systems integrity, PSA levels 1 and 2, analyses of operational inspections efficiency, analyses supporting I&C system replacement, studies dealing with optimization of operational and technical documents etc.

Within the PHARE/TACIS PH 2.13/95 project – Bubbler Condensate Experimental

Qualification (BCEQ) following experiments of the joint project for Dukovany NPP, Bohunice NPP, Mochovce NPP and Pakš NPP, pre-test and post-test analyses were performed, which helped to complete the qualification and at the same time, validated used computing codes.

In addition, Dukovany NPP actively participated in the 5th Framework Program of the EU within the VERLIFE project aimed at controlling life span of components and piping of the VVER power plants and further in the VERSAFE project comprising of two parts. The first one addressed problems related to serious accidents and the second one dealt with extension of VVER reactors life span.

Exchange of operational experience within WANO

Dukovany NPP has been a member of the World Association of Nuclear Operators (WANO) since 1990, within the Moscow center. The plant uses the organization's international electronic communication network - "Nuclear Network" to acquire experience, which effectively helps to improve its nuclear safety. In connection with the membership a "Peer Review" WANO mission took place at Dukovany NPP in 1997, concluding that the plant was operated at a high standard.

Joint activities of VVER-440/213 reactor units operators

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

Technical audit (internal, external)

A technical audit was held at Dukovany NPP in 1993-1995 in two stages:

- an internal technical audit, with the purpose to map the current status of the NPP systems and individual equipment. The equipment condition was evaluated using two approaches – first level PSA and using a deterministic approach with the employment of Operational Safety Report, studies and analyses. The internal audit was performed by the plant's own specialists and the resulting output was an overall evaluation of individual units, including proposals of modernization efforts relating to nuclear safety, reliability and economical operation;
- an external technical audit, whit the purpose of independent evaluation of nuclear safety provision at the individual units of the plant, in agreement with current international standards and generally recognized nuclear safety principles. The assessment was performed within the PHARE PH 4.2.9 program by a consortium of West European companies – ENAC- using the methodology for periodic safety review of nuclear power plants issued as IAEA Safety Series (SG-012) in cooperation with SÚJB. The final report contains a set of recommendations focusing particularly on enhancement of the defense "in-depth", and methodical procedures.

The results of the technical audits have been used as inputs for the anticipated modernization of Dukovany NPP.

Safety evaluation of Dukovany NPP units after 10 years of operation

In order to obtain a license to continue the operation of the Dukovany NPP units following

ten years of their operation, the national regulatory body required submission of a safety report in 1991. The report was supposed to demonstrate the status of nuclear safety provisions at the individual units, using the latest scientific knowledge and technology in compliance with valid legal regulations, IAEA recommendations and results of international missions.

The safety evaluation by the SÚJB of individual units following the 10 years of their operation, conducted in agreement with IAEA recommendations (SG-012, Periodic safety review), resulted in additional requirements for specific measures to increase the standard of nuclear safety provision. Apart from required analyses, the resolutions by SÚJB about continuing operation of individual units also demanded more documents demonstrating safety, draft program of works to improve safety and reliability, as well as requirements for implementation of such measures within the specified deadlines. These SÚJB requirements were incorporated into short-term measures, as well as into the anticipated modernization program. For more details refer to chapter 9.1.2.

Specific recommendations of AQG in relation to Dukovany NPP

In 2001 an assessment of the nuclear safety level of nuclear installations in candidate countries was performed in connection with preparation of the EU enlargement. The assessment was carried out by WPNS established with AQG, which is a working group of the EU Council. Reports evaluated by this group in relation to Dukovany NPP recommended to the Czech Republic to submit a report on measures adopted in order to complete assessment of complete verification of the bubbler system behavior at Dukovany NPP units 1 – 4 for all design accidents performed by the regulatory body.

The bubbler system verification was completed towards the end of 2003 within PHARE projects and a joint project of the Bohunice, Dukovany, Mochovce and Pakš nuclear power plants consortium. Work performed within the projects proved functionality of the bubbler systems of Dukovany NPP units 1 – 4 for all design accidents. The SÚJB evaluated the report of the consortium submitted to Dukovany NPP, together with the results of OECD NEA BC (Bubble-Condenser) Steering Group Activity Report and accepted their conclusions. Based on the SÚJB inspection focused on present condition of all subsystems of the containment system, their qualification and maintenance documents as well as on present status of all modifications prepared and implemented by the power plant based on BCEQ projects results, SÚJB considers the updated demonstration of Dukovany NPP containment system availability to carry out its function during the accident and after the accident throughout design life span of the power plant sufficient, for all design accident types.

Assessment by WENRA

In 2000 the association of Western Nuclear Regulatory Association (WENRA) performed an assessment of nuclear safety in the candidate countries for EU membership. The assessment of Dukovany NPP resulted in the following conclusions: the safety culture is sufficient, safety evaluation and document verification, i.e. periodic safety reviews are performed using procedures comparable with Western practices. Once the modernization program is fully completed it is expected that Dukovany NPP will achieve a safety level comparable with that of nuclear power plants of the same operational age in Western Europe.

Other safety review

The nuclear installation operator utilizes other instruments (probabilistic and deterministic) to monitor continuously and to evaluate periodically the nuclear safety of nuclear installations. These instruments are described in chapter 9.1.2.

1.1.2.2 Implemented and planned measures to improve the standard of nuclear safety

Situation following the Chernobyl accident

On November 20, 1986 the government of ČSSR adopted resolution No. 309 requiring implementation of the so-called "Back-fitting of Dukovany NPP", whose main purpose was to improve its nuclear safety. The resolution represented a response to the first findings from the Chernobyl accident. This resolution was adopted similarly as in many other countries, despite the fact the Chernobyl reactor had had entirely different physical and technical parameters than the pressurized water reactors employed in Dukovany. The initial design of the "Back-fitting" was completed in 1990, its implementation started in 1991 and was completed in 1996. Most of the anticipated measures were implemented. Moreover, a number of additional measures were introduced in equipment modernization outside the "Back-fitting" project.

A comprehensive assessment of the actual condition of the Dukovany NPP was performed in 1992 – 1997 (see chapter 1.1.2.1). Results of the assessment have been translated into the program of equipment modernization. For more details see Annex 4.

MORAVA Modernization Program for Dukovany NPP

In connection with activities described in chapter 1.1.2.1, the so-called Morava Modernization Program has been elaborated for Dukovany NPP. A general content of the modernization was established in 1997-1998. Essentially, the program represents a prioritized list of partial projects, their schedule for preparatory works and implementation and assessment of their feasibility. The implementation of the modernization program is in progress. The purpose of the modernization program is to achieve compliance with worldwide safety practices.

The most important project currently under way has been the replacement of the I&C system on safety-important parts for digital systems. The replacement is and will be performed gradually during refueling outages of units and its completion has been scheduled for 2010. A tender was conducted for preparation and implementation of the project and a contract was signed in September 2000 with a consortium of FRAMATOME and Schneider Electric. Implementation of the I&C system renovation was commenced in 2002 for unit 3 and in 2004 for unit 1.

1.1.3 Temelín NPP

1.1.3.1 Overview of nuclear safety assessments performed and their main conclusions

History of the project and its assessments

The decision to construct a nuclear power plant at Temelín site was made in 1980 as a result of an expert site selection procedure for 4 nuclear units with VVER-1000 reactors. The contract for a supply of the so-called "Technical design" from the former USSR was signed in 1982. The design included the reactor building, auxiliary building and diesel generator stations. The design of the plant's secondary part falls within the competence of the Czech party to the contract. The Basic Design of the Temelín units 1 and 2 was completed by the general designer company Energoprojekt (EGP) Praha in 1985. The planning procedure was held in 1985 and the construction permit was provided in November 1986. Construction of the buildings was launched in February 1987 while preparatory works at the site had already started in 1983.

Czech and Slovak specialists analyzed and subsequently modified the original design as early as before 1989. After 1989 the demand of the Czech Republic for power of 4000 MW was re-evaluated and at the same time new analyses of the design nuclear safety were performed, taking into account experience from Western nuclear power plants. In March 1993 the decision was made in the Czech Republic to complete only two units of the Temelín NPP only. The fuel loading into Unit 1 took place in July 2000 and the fuel loading into Unit 2 took place in March 2002.

Appraisals by international experts

Several international missions have been performed at the Temelín NPP since the early 1990s. These missions were invited for the purpose of independent appraisal of the original design and some other aspects of the plant construction from the viewpoint of internationally recognized standards.

In 1990, upon invitation from the then Czechoslovak government, the IAEA organized the following three international missions of experts:

- mission aimed at evaluating the site safety (April 1990),
- Pre-OSART mission, dealing with construction practices and preparation of safe operation (turn of April/ May 1990),
- mission focused at the safety systems evaluation, core design and safety analyses (turn of June/July 1990).

The missions concluded that the design of the Temelín NPP, its siting and organization of construction did not show any significant deviations from international practices. Final reports from the missions [1-8], [1-9], [1-10] included partial recommendations supposed to contribute to safety enhancement. The recommendations were implemented both in form of changes of and amendments to the design and within the organization of the construction and preparation for future operation.

A follow-up Pre-OSART mission took place in February 1992 to assess to what degree the 1990 recommendations [1-11] were considered and implemented in the construction and preparation for future operation.

Other significant activities by the IAEA in respect to the Temelín NPP included particularly the following:

- QARAT mission focused on quality assurance (turn of March/April 1994) [1-12],
- consultants meeting on the Temelín NPP design changes held at the IAEA Headquarters in Vienna (turn of November/December 1994) [1-13],
- mission focused on fire protection (February 1996) [1-14].

A special IAEA mission in 1996 examined how Temelín NPP addressed the safety issues identified by the IAEA as generic for nuclear power plants with VVER-1000/320 type reactors [1-15]. The mission evaluated the plant's upgraded design, implementation of previously proposed alterations and its preparedness 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, ČEZ, a. s., had spent a significant effort to improve the plant's design [1-16]. The mission emphasized that the combination of Western and Eastern technology in the Temelín NPP design was very carefully considered. In the mission's opinion, in some cases such a combination of Western and Eastern technologies resulted in a significant improvement of the safety assurance level in comparison with international practices.

A follow-up mission of the same type took place in November 2001. The status of each VVER 1000/320 safety issue as specified by the IAEA can be found in the Annex 2.

In addition to the above mentioned there were a number of other expert IAEA missions at the Temelín NPP, e.g. two IPERS missions on the PSA study, three missions on LBB analyses an IPPAS mission in 1998 and a Follow-up IPPAS mission on physical protection in 2002.

Another Pre-OSART mission took place in the early 2000 in February 2001 a full-scope OSART mission was held at the Temelín NPP and in 2003 a Follow-up OSART mission took place. See Annex 3.

Assessments from the bilateral cooperation with Germany

Within the framework of activities based on the valid bilateral agreement between BMU and SÚJB on the exchange of information on nuclear safety and radiation protection, discussions were held about safety of Temelín NPP and Isar NPP. The parties have agreed on seven selected nuclear safety issues at the Temelín NPP to be considered in detail by GRS. The assessment was completed in the fall 2000 concluding that no nuclear safety-related reasons have been found preventing commissioning of the Temelín NPP. Further, it has been concluded that from the viewpoint of German standards, the design mostly complies and in the remaining cases the design mostly meets standards of other Western countries and the USA.

Finally, GRS has kept open two issues where it was unable to assess from the available sources, whether the design solution of the steamline and feedwater piping is sufficient to prevent subsequent damage. GRS also expressed the need to document that qualification requirements for safety valves on steam-generators and condenser dump valves for water-steam mixture have been met for the specific conditions at the Temelín NPP.

Assessments by WENRA

There are also results available from two assessments by the association of regulatory bodies from Western countries – WENRA – performed in 1998 and 2000. Main conclusions from the WENRA report issued in October 2000 are the following:

- The program for the Temelín NPP safety improvement is the most comprehensive one ever used for VVER-1000/320 units;
- International cooperation has significantly influenced safety improvements (design, operation, safety approvals) and development of safety culture at the plant;
- A combination of Eastern and Western technologies has been successfully mastered. Interfaces between different technologies have been considered within the modernization program and a standard Western approach has been used for combining Eastern and Western technologies. It will be necessary to confirm correctness of the combination during the plant's commissioning;
- Only two safety issues have been mentioned as requiring more clarification and if resolved, Temelín NPP will achieve a safety standard comparable with to safety standard of PWR units operated in the West.

The process of combining Eastern and Western technologies was evaluated by ENCONET Consulting (Austria). The conclusion has been similarly favorable as that by WENRA in 2000.

Specific recommendations of AQG in relation to the Temelín NPP

Two recommendations were included in the Atomic Question Group report (see chapter

1.1.2.1) in relation to the Temelín NPP. The first one recommended assuring assessment proving sufficient protection against high-energy pipe break and potential subsequent damage to steamline and feedwater piping (short-term priority). The second one recommended informing on measures to complete the proof of reliable function of important steam relief and safety valves at dynamic load with steam-water mixture flow. Report on implementation of these recommendations was submitted to the EC in November 2002.

On the high-energy pipe break protection – a combination of:

- extremely low likelihood of a sudden break of the pipeline under normal or abnormal operation conditions or safe shutdown earthquake;
- application of "no break zone/super-pipe" concept that precludes sudden pipe break for the area from containment penetration to anchoring point (supported by periodic 100% UT NDE monitoring qualified in accordance with the best European practice – ENIQ);
- existing pipe whip restraints installed at break zones postulated in accordance with international standards to eliminate pipe whip and consequential damage of adjacent pipes or safety related equipment;
- implementation of high energy lines surveillance systems additional to 100% UT NDE: corrosion-erosion monitoring (validated by use in the Dukovany NPP monitoring system) and possible follow-up displacement measurement (if needed);
- results of safety analyses, performed in accordance with best European practices and using validated codes and methods, demonstrating for the Temelín NPP VVER-1000 sufficient safety margins for sequences induced by credible initiating events;

is well above requirements set forth in Czech national standards and satisfy recommendation defined by the WPNS (as its technical meaning was interpreted by the SÚJB).

On the key relief and safety valves reliable function demonstration for two-phase flow – the qualification of respective valves was re-confirmed by development of new qualification files in accordance with international standards also widely applied in the EU. The principle is in extension of parent valve (same manufacturer, comparable characteristic) full scope test results to valve under review.

Analyses contracted by the future operator

In addition to the activities listed above, ČEZ, a. s. contracted the American Consulting company Halliburton NUS in 1991 to perform an audit focused on the technical concept of the power plant and to verify whether the plant would be licensable with respect to standards accepted in developed countries. The audit concluded that the license might be obtained in case all the specified recommendations were fulfilled as well as the requirements of the state regulatory bodies were fulfilled.

Moreover, some analyses were performed by COLENCO (Switzerland) and TŰV Bayern e. V. (Germany), which closely focused on I&C design assessment.

Other safety review

Nuclear installation operator utilizes other instruments (probabilistic and deterministic) to monitor continuously and to evaluate periodically the nuclear safety of nuclear installations. These instruments are described in chapter 9.1.2.

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 expertise organized 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, once implemented, will assure that the Temelín NPP units 1 and 2 reach engineering standards usual for Western power plants in the late 1990s.

Recommendations for the design improvement were handed over to the general designer, EGP Praha, to be implemented in form of amendments into the Basic and Detail design, in co-operation with other specialized companies and major suppliers of technology.

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

- replacement of the I&C system, including its new design,
- replacement of the nuclear fuel, including a new core design,
- replacement of the original radiation monitoring system, including its design,
- replacement and supplementing of the diagnostic system,
- replacement of original cables with fire-proof and non-propagating fire ones,
- significant changes in the electric part of the design
  - electric protections,
  - addition of 4th and 5th diesel generators,
  - increased capacity of accumulators, etc.

A detailed list of significant changes and improvements is provided as table in the Annex 1.

To complement the preliminary safety documents, all safety analyses were repeated while taking into account all technical improvements and replacements. These analyses were performed using advanced Western computing codes and to depth and in structure required by Western standards (US NRC Regulatory Guide 1.70). Results of the probabilistic safety assessment studies level - 1 and 2 will complement the above-mentioned deterministic analyses to assess the final configuration of the Temelín project.

1.1.3.3 present status of Temelín NPP commissioning

Non-active stage of testing (before nuclear fuel loading) took place in the period from March to June 2000 at Temelín NPP Unit 1. The first fuel loading started on July 6, 2000. Subsequently, the active stage of testing the physical start-up proceeded, which resulted in achievement of initial criticality on October 11, 2000. The power start-up within the active testing started on October 31. The equipment was continuously tested at the following reactor power output levels: 5 % N_{nom}, 12 % N_{nom}, 30 % N_{nom}, 45 % N_{nom}, 55 % N_{nom}, 75 % N_{nom}, 90 % N_{nom} and 100 % N_{nom}.

The active testing was completed at Temelín NPP Unit 1 on June 10, 2002 at 11.35 a.m. by a 144 hours complex testing. Subsequently, the trial operation started based on a license issued by the SÚJB, which partially proceeded in 2004. The first refueling outage took place at the Temelín NPP Unit 1 from January 31, 2003 until June 26, 2003.

Non-active stage of testing of Temelín NPP Unit 2 (before nuclear fuel loading) took place in the period November 2001 to March 2002. The first fuel assembly was loaded into the Unit 2 reactor on March 4, 2002. Initial criticality of Unit 2 reactor was achieved on May 31, 2002. From June 2002 the power start-up of Unit 2 proceeded, which was distributed to the power output levels 30 % N_{nom}, 55 % N_{nom}, 75 % N_{nom} and 100 % N_{nom}.

Power start-up tests were completed on April 7, 2003 and after completion of the 144-hours complex testing, the Unit 2 upon SÚJB approval, was put into trial operation on April 18, 2003.

1.2 Statement on the implementation of the obligations concerning Article 6 of the Convention – position of the Czech Republic on the current status of nuclear safety and future operation of the nuclear installations

All the above-mentioned studies and analyses unequivocally prove that the level of nuclear safety provision at Dukovany NPP and Temelín NPP units is high and in compliance not only with current requirements valid in the Czech Republic but also with internationally accepted practices. The nuclear safety status has been systematically reviewed and evaluated from the viewpoint of the latest scientific and technical knowledge. Necessary activities are planned and implemented so that the current status is maintained or further improved in the future. By reasons provided in this chapter it is evident that the requirements resulting from Article 6 of the Convention are fulfilled.

Fig. 1-1 Map of the Czech Republic indicating the nuclear power plants on its territory

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

1. *Each contracting party shall establish and maintain a legislative and regulatory framework in order to provide for safety of nuclear installations.*

2. *The legislative and regulatory framework shall include:*
   - *(i) establishing of applicable national safety requirements and regulations;*
   - *(ii) a system of licensing with regard to nuclear installations and a prohibition to operate a nuclear installation without the respective license;*
   - *(iii) a system of inspections and assessments of nuclear installations by the national regulatory body to ascertain compliance with applicable regulations and terms of the licenses;*
   - *(iv) application and enforcement of the applicable regulations and terms of the licenses, including license suspension, modification or withdrawal.*

2.1 Description of the current situation

2.1.1 Development of national legislative and regulatory framework

The legislative and regulatory framework for the nuclear energy industry in the Czech Republic has had a relatively long history. Its beginnings, dating back to second half of 1970s, are connected with the construction and operation of first nuclear power plants with VVER reactors in former Czechoslovakia.

The next stage of the development of state supervision is connected with the establishment of the independent state Czech Republic at the turn of 1992–1993. The Act No. 21/1992 Coll. established the State Office for Nuclear Safety (SÚJB), which took over, from January 1, 1993, an office to carry out the state supervision of nuclear safety in the Czech Republic.

Development of a new Act began practically at the same time, with the objective to comprehensively re-codify utilization of nuclear energy and ionizing radiation and, in particular, to address issues insufficiently regulated by then, e.g. radioactive waste management, liability for nuclear damages, emergency preparedness etc.

2.1.2 Valid legislation in the area of utilization of nuclear energy and ionizing radiation

The Atomic Act (Act No. 18/1997 Coll**.,** on peaceful utilization of nuclear energy and ionizing radiation) was approved by the Czech Republic's Parliament in January 1997. The Atomic Act entrusted execution of the state administration and supervision of peaceful utilization of nuclear energy and radiation practices to SÚJB and redefined the scope of its competency and powers.

The Atomic Act has defined conditions for peaceful utilization of nuclear energy and ionizing radiation, including the activities requiring SÚJB license. An extensive list of obligations of the licensees includes, among other items, obligations relating to their preparedness for a radiation accident.

In the area of radioactive waste management, the Act entrusted responsibility for final disposal of all radioactive wastes to the state and ordered to the Ministry of Industry and Trade of the Czech Republic to establish a new governmental organization for the purpose – the Administration of Radioactive Waste Repositories. Activities of the Administration shall be funded from a so-called "nuclear account" whose main income is represented by payments

from radioactive waste producers.

The Atomic Act transferred into the Czech legal system a number of obligations resulting 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 acceded.

Since 1997 the Atomic Act has been amended several times. The most significant amendment was performed by the Act No. 13/2002 Coll., which was particularly adopted in connection with the preparation of the Czech Republic for accession to the European Union, aimed at enabling the implementation of obligations arising from newly concluded international treaties. In connection with this Act, which became effective on July 1, 2002, the respective SÚJB Decrees were amended. As evident from the listing of legal regulations given in the Annex 5, the provisions related to radiation protection were amended in particular by reason of assuring the compatibility with the respective European directives.

The Atomic Act authorized the SÚJB, and in strictly defined cases other bodies of the state administration, to issue a set of related implementing regulations, such as the following:

- ***SÚJB Decree No. 214/1997 Coll.,*** on quality assurance in activities related to the utilization of nuclear energy and in radiation practices, and laying down criteria for the assignment and categorization of classified equipment into safety classes,
- ***SÚJB Decree No. 215/1997 Coll.,*** on criteria for siting nuclear installations and very significant ionizing radiation sources,
- ***SÚJB Decree No. 106/1998 Coll.,*** on nuclear safety and radiation protection assurance during commissioning and operation of nuclear facilities,
- ***SÚJB Decree No. 195/1999 Coll.,*** on basic design criteria for nuclear installations with respect to nuclear safety, radiation protection and emergency preparedness,
- ***SÚJB Decree No. 185/2003 Coll.,*** on decommissioning of nuclear installation or workplaces of category III or IV,
- ***SÚJB Decree 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 authorizations to selected personnel, and the form of documentation to be approved for the licensing of expert training of selected personnel, as amended by SÚJB Decree No. 315/2002 Coll.,
- ***SÚJB Decree No. 307/2002 Coll.***, on radiation protection,
- ***SÚJB Decree No. 318/2002 Coll.,*** on details of emergency preparedness of nuclear installations and workplaces with ionizing radiation sources and on requirements on the content of on-site emergency plan and emergency rule, as amended by SÚJB Decree No. 2/2004 Coll.,
- ***SÚJB Decree No. 319/2002 Coll.,*** on performance and management of the national radiation monitoring network,
- ***Government Order No. 11/1999 Coll.***, on emergency planning zone.

A list of the above-mentioned regulations is provided in the Annex 5, and a complete text of the Atomic Act, including its implementing decrees is available at the SÚJB web pages www.sujb.cz.

In 2000 the so-called "Emergency Acts" were adopted, a list of which, together with other legal regulations ensuring implementation of the Atomic Act, is provided in the Annex 5.

The legislative framework is concluded with recommendations and guidelines published since

1978 by the State Office for Nuclear Safety in a special non-periodic series of publications: "Safety of Nuclear Installations - Requirements and Guidelines".

Approval process, inspections and enforcement of compliance with the regulations

The basic legal standard governing the approval process for nuclear installations includes, in addition to the above-mentioned Atomic Act and Act No. 50/1976 Coll., the Civil Construction Act, as amended. Other most important legal regulations related to this area are in particular Act No. 71/1967 Coll., on administrative proceedings, as amended; Act No. 552/1991 Coll., on state inspection, as amended; Act No. 100/2001 Coll., on environmental impact assessment as amended; Act No. 106/1999 Coll., on free access to information, as amended and Act No. 123/1998 Coll., on free access to environmental information, as amended by the Act No. 186/2004 Coll. as well as other legal regulations.

According to the Civil Construction Act, the local authorities (the respective competent departments of planning and building control) are entrusted with the issuance of four key resolutions for facilities containing nuclear installations, i.e. planning and site decision, construction permit, operation license and decommissioning permit.
Provided the related procedure involves interests protected by special regulations, such as nuclear safety or radiation protection, the department of planning and building control shall decide in cooperation with or based on an approval from the respective state administration bodies protecting such interests. A respective state administration body shall condition its approval upon fulfillment of conditions specified in its resolution issued in agreement with the special act entitling the body to do so. The bodies include in particular:

- technical inspection bodies dealing with conventional safety, including safety of pressure components and electric systems,
- regional and municipal authorities in respect to fire safety, waste management, water consumption and effluents discharge,
- Czech Environmental Inspection – in respect to air pollution,
- Local body in charge of public health protection in respect to industrial safety in agreement with Act No. 258/2000 Coll., on public health protection, as amended.

Section 126 of the Civil Construction Act expressly establishes that the department of planning and building control, before issuing any resolution on siting, building permit or any additional resolution about a particular project involving a nuclear installation, shall request from the applicant a license (approval) issued by SÚJB under the Atomic Act. Under the Act provisions, the department of planning and building control shall not issue any resolution unless the said license is submitted.

The Atomic Act establishes activities for which a license issued by the SÚJB is required. Apart from the main activities - siting, construction and operation, there are a number of other activities, e.g. SÚJB licenses 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 provided in chapter 3.2.1.

Act No. 17/1992 Coll., on the environment, as amended, and especially Act No. 100/2001 Coll., on environmental impact assessment, as amended, impose the obligation to assess constructions from the viewpoint of their impact on the environment (to perform the "Environmental Impact Assessment") within a special proceedings open to the public represented by the respective municipality, which is a party to the proceedings, or by the civil association. The Ministry of the Environment is the state administration body responsible for the issuance of a resolution concerning the environmental impact of the nuclear power plant.

Inspection activities to be performed by SÚJB are defined in detail in Section 39 of the Atomic Act, as well as in Act No. 552/1991 Coll. on state inspection, as amended.

Instruments applied to enforce the legislative requirements are regulated by Sections 40 and 41 of the Atomic Act. SÚJB is authorized to require the inspected person to remedy the situation, to perform technical checks, inspections or functional ability tests, to withdraw authorizations about special professional competence and to impose penalties for violating obligations established in the Atomic Act.

In case there is a risk of delay, the SÚJB is authorized to impose the obligation to reduce the power output or to suspend operation of the nuclear installation. Issues of alteration, cancellation and cessation of a license are regulated by Section 16 of the Atomic Act, which authorizes SÚJB to restrict or to suspend performance of the licensed activity if the licensee has failed to fulfill the obligations thereunder.

More details of the legislation mentioned above and the licensing procedure below, are described later, particularly in chapters 9, 10, 11, 12, 13 and 14.

2.1.3 Multilateral international treaties and treaties with international organizations

Part of the valid Czech legislation in the given area are the following international treaties signed by the Czech Republic (or the former Czechoslovak Socialist Republic and later the Czech and Slovak Federal Republic):

- The Agreement between the Czech Republic and the International Atomic Energy Agency on Safeguards, based on the Treaty on Non-proliferation of Nuclear Weapons (in Vienna on September 18, 1996, through communication of the MZV No. 68/1998 Coll.).
- The Supplemental Protocol to the Agreement between the Czech Republic and the International Atomic Energy Agency on Safeguards, based on the Treaty on Non-proliferation of Nuclear Weapons (September 21, 1999).
- The Treaty on Non-proliferation of Nuclear Weapons (Decree by the MZV No. 61/1974 Coll., of March 29, 1974).
- Adapted supplemental Agreement on Technical Assistance provided by the International Atomic Energy Agency to Government of the Czech and Slovak Federal Republic (in Vienna on September 20, 1990, No. 509/1990 Coll.).
- The Convention on the Physical Protection of Nuclear Materials (in Vienna on October 26, 1979, communication of the MZV No. 114/1996 Coll.).
- The Convention on Early Notification of a Nuclear Accident (in Vienna on September 26, 1986, communication of the MZV No. 116/1996 Coll.).
- The Convention on Assistance in the Case of a Nuclear or Radiation Accident (in Vienna on September 26, 1986, communication of the MZV No. 115/1998 Coll.).
- Nuclear Safety Convention (in Vienna on June 17, 1994, communication of the MZV No. 67/1998 Coll.).
- The Joint Convention on Safety in Spent Nuclear Fuel Management and in Radioactive Waste Management (in Vienna on September 5, 1997, UV No. 593/1997, ratified on March 26, 1999).
- Vienna Convention on Civil Liability for Nuclear Damage (in Vienna on May 21, 1963, ratified, communication of the MZV No. 133/1994 Coll.).
- The Joint Protocol relating to the Application of the Vienna and Paris Conventions on Liability for Nuclear Damage (in Vienna in 1988, ratified, communication of the MZV No. 133/1994 Coll.).

- The Convention on Korean Energetics Development Organization (KEDO) – letter of the MZV on acceptance of the Agreement of March 9, 1995 and of the supplemental Protocol of 1997 by the Czech Republic dated January 27, 1999; the Czech Republic became a member on February 9, 1999.
- The Treaty on General Ban on Nuclear Weapons Tests (has not became valid as yet, the Czech Republic's Government Order No. 535/1996).
- The Protocol on Amendment to the Vienna Convention on Civil Liability for Nuclear Damage (in Vienna on September 12, 1997, signed by the Czech Republic on June 18, 1998, however has not been ratified as yet).
- The Convention on Supplementary Compensation for Nuclear Damage (in Vienna on September 12, 1997, the Government Order No. 97/1998, signed by the Czech Republic, however has not been ratified).

The obligation to inform about significant events relating to nuclear safety is also established in the bilateral agreements entered by the Czech Republic or its predecessors.

2.2 Statement on the implementation of the obligations concerning Article 7 of the Convention

A system of the described legal documents – acts, decrees, governmental orders, international treaties and intergovernmental agreements by its nature and contents meets the requirements established in paragraphs 1 and 2 of the Article 7 of the Convention.

3. Regulatory Body - Article 8 of the Convention

(i) Each Contracting Party shall establish or designate a regulatory body entrusted with implementation of the legislative and regulatory framework referred to in Article 7, and shall provide the body with adequate authority, competence and financial and human resources to fulfill its assigned responsibilities;

(ii) Each Contracting Party shall take appropriate steps to ensure effective separation between the functions of the regulatory body and those of any other body or organization concerned with the promotion or utilization of nuclear energy.

3.1 Description of the current situation

3.1.1 Mandate and competence of the regulatory body

The SÚJB (State Office for Nuclear Safety) was established through the Act No. 21/1993 Coll., passed by the Czech National Council as a central authority of the state administration of the Czech Republic. In agreement therewith after the dissolution of the Czech and Slovak Federal Republic, the SÚJB assumed power and competency of the former ČSKAE in respect to the state supervision of nuclear safety and nuclear materials. In July 1995 the Czech Republic's Parliament extended the SÚJB competence to include issues of protection against ionizing radiation. As a result Czech Regulatory bodies in charge of nuclear safety and radiation protection have merged and the SÚJB has become an integrated state administration body which carries out the state supervision for the whole area of the utilization of nuclear energy and ionizing radiation.

Since July 1, 1997 the competence of the SÚJB has been defined by the Atomic and according to its Section 3:

(1) State administration and supervision of the utilization of nuclear energy and ionizing radiation and in the field of radiation protection shall be performed by the State Office for Nuclear Safety (hereafter referred to as "the SÚJB").

(2) The SÚJB

a) shall carry out State supervision of nuclear safety, nuclear items, physical protection, radiation protection and emergency preparedness and shall inspect the adherence to the fulfillment of the obligations arising out of this Act;

b) shall monitor non-proliferation of nuclear weapons and carry out state supervision of nuclear items and physical protection of nuclear materials and nuclear installations;

c) shall issue licenses to perform practices governed by this Act and shall issue type-approvals for packaging assemblies for transport and storage of nuclear materials and radioactive substances given in an implementing legal regulation, ionizing radiation sources and other products;

d) shall issue authorizations for activities performed by selected personnel;

e) shall approve documentation, programs, lists, limits, conditions, methods of physical protection assurance, emergency rules and, subject to discussion with the relevant Regional Authorities and relevant Municipal Authorities of Municipalities with extended competence of compatibility with off-site emergency plans, on-site emergency plans and their modifications;

f) shall establish conditions, requirements, limits, maximum permitted levels, maximum permitted levels of radioactive contamination of foodstuffs, guidance levels, dose constraint, reference levels, diagnostic reference levels, exemption levels and clearance

levels;

g) shall establish the emergency planning zone and, if applicable, its further structuring, and shall approve delineation of the controlled area;

h) in accordance with an implementing legal regulation, shall establish requirements on emergency preparedness of licensees, and shall inspect their fulfillment;

i) shall monitor and assess the exposure status and regulate exposure of individuals;

j) shall issue, register and verify personal radiation passport; related details shall be set out in an implementing legal regulation;

k) shall provide information to municipalities and Regional Authorities concerning radioactive waste management within their territory of administration;

l) shall control the activity of the National Radiation Monitoring Network, the functions and organization of which shall be set out in an implementing legal regulation, shall provide for the functioning of its head-office, and shall provide for the activities of an Emergency Response Center and for an international exchange of information on the radiation situation;

m) 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;

n) shall maintain a State system of accounting for and control of nuclear materials and data and information in accordance with international agreements binding on the Czech Republic, and shall set out requirements for accounting methods and inspection thereof in an implementing legal regulation;

o) shall maintain a national system for registration of licensees, registrants, imported and exported selected items, ionizing radiation sources, and a record of exposure of individuals;

p) shall ensure, by means of the National Radiation Monitoring Network and based on assessment of a radiation situation, the availability of background information necessary to take decisions aimed at reducing or averting exposure in the case of a radiation accident;

r) shall approve a classification of nuclear installation or its components and nuclear materials into appropriate categories, from the physical protection viewpoint;

s) shall perform the function of the national authority for an international verification of a comprehensive ban of nuclear tests;

t) shall ensure international co-operation within its sphere of competence and, in particular, shall be an intermediary of technical co-operation with the International Atomic Energy Agency, and within its sphere of competence shall communicate information to the European Commission or, if applicable, to other bodies of the European Union;

u) shall decide on assurance of handling nuclear items, ionizing radiation sources or radioactive wastes having been treated inconsistently with rules of law, or where the detrimental condition is not being removed;

v) shall be obliged to give out information according to special legal provisions and once a year to publish a report on its activities and submit it to the Government and to the public.

The competence of the SÚJB has been further extended by Act No. 19/1997 Coll., to include state administration and inspecting of the ban on chemical weapons and by a similar amendment governed by the Act No. 281/2002 Coll., in respect to the ban on biological weapons.

3.1.2 Rights and responsibilities of the regulatory body

Section 9, paragraph 1 of the Atomic Act establishes the following preconditions for the utilization of nuclear energy and ionizing radiation:

(1) A license issued by the SÚJB is required for:
a) siting of a nuclear installation or radioactive waste repository;
b) construction of a nuclear installation or category IV workplace;
c) particular stages, laid down in an implementing legal regulation, of nuclear installation commissioning;
d) operation of a nuclear installation or category III or IV workplace;
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 category III or IV workplace;
g) particular stages of decommissioning of a nuclear installation or category III or IV workplace to the extent and in the manner established in an implementing legal regulation;
h) discharge of radionuclides into the environment to the extent and in the manner established in an implementing legal regulation;
i) ionizing radiation sources management to the extent and in the manner established in an implementing regulation;
j) radioactive waste management to the extent and in the manner established in an implementing legal regulation;
k) import or export of nuclear items or transit of nuclear materials and selected items;
l) nuclear materials management;
m) transport of nuclear materials and radioactive substances laid down in an implementing legal regulation; this license 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 (Section 18 paragraph 5);
o) re-import of radioactive waste originated in the processing of materials exported from the Czech Republic;
p) international transport of radioactive wastes to the extent and in the manner established in an implementing regulation;
r) performance of personal dosimetry and other services significant from the viewpoint of radiation protection to the extent and in the manner established in an implementing regulation;
s) adding of radioactive substances into consumer products during their manufacturing or preparation or import or export of such products.

Other provisions of the Atomic Act define:

- conditions to be fulfilled before a license is issued (Section 10),
- probity and professional competence of the applicant for a license (Sections 11 and 12),
- application for a license (Section 13),
- SÚJB administrative procedure (Section 14),
- license particulars (Section 15),
- alterations, cancellations and cessation of license (Section 16).

Execution of the state supervision of peaceful utilization of nuclear energy and ionizing radiation is governed by Chapter 6 of the Atomic Act, which comprises:

- supervising activities of the SÚJB (Section 39),
- remedial measures (Section 40),

- penalties (Sections 41 and 42).

Thus, the Atomic Act, together with Act No. 552/1991 Coll., on state inspection, as amended, which generally governs procedure of the state administration bodies when performing inspection activities, provides the SÚJB with corresponding power and competency for execution of the state supervision. The SÚJB checks whether the bodies which obtained a license in accordance with Section 9, paragraph 1 observe the requirements of the Atomic Act and other relevant regulations. Inspection activities of the SÚJB are governed in detail by Section 39, paragraph 1 of the Atomic Act.

The SÚJB inspection staff are nuclear safety and radiation protection inspectors appointed by the Chairperson of SÚJB. They work at the SÚJB Headquarters and directly at the sites of Dukovany and Temelín nuclear power plants, as well as in the Regional Centers (see Chapter 3.1.4). Within their inspection activities, the inspectors and also the Chairperson of SÚJB, are particularly authorized to:

- enter at any time facilities, installations, operational areas, territories and other workplaces of inspected persons where activities related to nuclear energy utilization or radiation practices are carried out,
- check on 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 fulfillment of all set obligations for the provision of nuclear safety, radiation protection, physical protection and emergency preparedness of a nuclear installation and to perform measurements and collect samples at the premises of inspected persons, such as are necessary for checking the compliance with the Atomic Act and other regulations issues on its basis,
- verify professional competence and special professional competence under the Atomic Act,
- participate in investigations and clean-up of events with an impact on nuclear safety, radiation protection, physical protection and emergency preparedness, including unauthorized handling of nuclear items or ionizing radiation sources.

A SÚJB inspector shall be authorized, depending on nature of the identified shortcoming, to:

- require the inspected person to remedy the situation within a set period of time period,
- nuclear safety and radiation protection withdraw the special professional competence authorization issued to an employee of the inspected person, in the event of serious violation of his/her obligations or his/her failure to meet the requirements of professional competence, and physical or mental capability,
- propose a penalty.

The SÚJB is authorized, in the event of a hazard arising from delay or an 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 an installation of components or systems of nuclear installations. Further it is authorized to prohibit the handling of nuclear items, ionizing radiation sources or radioactive waste, or impose on the inspected person to suffer the imposition of management by another person, at the expense of the inspected person.

Violation of a legal obligation established in the Atomic Act may be fined by the SÚJB with a penalty up to the amount specified in Section 41 and in agreement with the rules specified in Section 42. The binding procedures for inspection activities are set forth in the SÚJB internal

regulations.

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. Within its power and competency the SÚJB is responsible neither to the Ministry of Trade and Industry nor to the Ministry of the Environment. The statute of the SÚJB within the state administration structure is shown in Fig. 3-1. The SÚJB has its own budget approved by the Parliament of the Czech Republic as a part of the state budget. The SÚJB is headed by a Chairperson appointed by the Government of the Czech Republic. Since 1984 the SÚJB (theretofore ČSKAE) submits regular annual reports on results of its activities to the Government of the Czech Republic.

3.1.4 Structure of the regulatory body, its technical support, material and human resources

For 2004, the SÚJB was allotted a staff of 194, approximately 2/3 of that number represents nuclear safety and radiation protection inspectors. The SÚJB budget for 2004 is approximately 327 million Czech crowns (about 10,3 million euro), total budget including the organizational units of the State and budget organizations included in its department is 374 million Czech crowns (about 11,7 million euro). Under the present Czech Republic conditions, the material and human resources are sufficient for the fulfillment of basic functions to be performed by the SÚJB under the law.

The organizational structure of the SÚJB is shown in Fig. 3-2, and it consists of:

- a Section of Nuclear Safety, including the department for assessment of nuclear installations, the department of inspection of nuclear installations and the division of radwaste and spent fuel management;
- a Section of Radiation Protection, including the department of radiation exposure regulation, the department of sources, the department of radiation protection of fuel cycle and the division of radiation protection activities assessment;
- a Section of Management and Technical Support including the international cooperation department, the economic department, the office bureau (dealing with legal issues, personnel training, coordination of scientific efforts and research etc.), the department of checking the ban on nuclear weapons and the department of checking the ban on chemical and biological weapons;
- a Division of crisis coordination center (reporting directly to the SÚJB Chairperson);
- a Division for coordination of activities associated with the accession to the European Union (reporting directly to the SÚJB Chairperson);
- The Advisory bodies for the SÚJB Chairperson;
- an Regional SÚJB Centers in Praha, Plzeň, České Budějovice, Ústí nad Labem, Hradec Králové, Brno and Ostrava, which are subordinated to the Radiation Protection Section;
- Site inspectors managed by the Nuclear Safety Section at both nuclear power plant sites (Dukovany and Temelín).

Moreover, the SÚJB also acts as a managing authority of the National Radiation Protection Institute (SÚRO), an organization unit of the State providing expert and technical support in the area of radiation protection, and the State Institute for Nuclear, Chemical and Biological Protection (SÚJCHBO), an allowance organization providing for primary expert and technical supports for the SÚJB in chemical and radiation safety. Responsibilities within the SÚJB organizational structure are established by the Organizational Statute and other internal regulations.

Advisory groups made up of independent experts have been used since 1998 to provide expert support to the SÚJB in respect to nuclear safety and radiation protection.

3.1.5 Relations between the regulatory body other state administration bodies

It is obvious from the above-listed legislative documents and the state administration structure in the Czech Republic, that power and competency of the SÚJB are sufficient to perform the state supervision of nuclear safety and radiation protection. At the same time the scope of powers assigned to the SÚJB does not either coincide or contradict to that of any other state administration body.

3.1.6 Independent assessments of the national regulatory body

Chapters 2 and 3 hereof describe the changes in the supervisory and legislative framework introduced in the second half of 1990s. After their completion and full implementation the Czech Republic the International Atomic Energy Agency requested to independently assess result of the said efforts. The assessment was performed in form of two international expert IRRT (International Regulatory Review Team) missions, which reviewed the SÚJB in January 2000 and in June 2001.

The first review was a reduced-scope inspection mission focusing mainly on SÚJB activities relating to the licensing procedure for Temelín NPP. The inspection team drew the following conclusions from the mission:

- there is a clearly defined legislative framework in place for Temelín NPP licensing and the SÚJB is required to issue a license for each defined key stage throughout the construction and acceptance period;
- the SÚJB has established requirements as the state regulatory body in respect to the level of nuclear safety assurance at Temelín NPP and has adopted a flexible approach to assure that the adopted inspection and assessment criteria are fulfilled;
- the SÚJB has a previously established plan of inspections applied by its inspectors who check on and confirm that the licensee is commissioning the plant in agreement with the conditions specified in the respective licenses;
- experience and assistance of regulatory bodies from West European countries and the USA have been employed to develop an appropriate state regulatory system in respect to licensing, supervision, assessment and inspecting of Temelín NPP.

Members of the reviewing team handed over several recommendations to the SÚJB whose implementation might further strengthen performance of the state supervision. All suggestions and recommendations concern the long-term development of the SÚJB and arise from current methodical procedures and the achieved results.

The second mission performed a full-scope review of state supervisory activities in peaceful utilization of nuclear energy and ionizing radiation. Twelve experts from nine countries (Germany, USA, Great Britain, Finland, Slovenia and Switzerland plus observers from Austria and Armenia) carried out a detailed review of all aspects of state supervisory activities performed by the SÚJB under the Atomic Act, including supervision of nuclear safety, radiation protection, emergency planning and transports of radioactive materials. According to the results presented by the experts in a final report from the mission, the experts concluded that both the legislative framework and execution of the state supervision of peaceful utilization of nuclear energy and ionizing radiation were at a very good standard, on par with worldwide accepted practices.

In respect to the position of the regulatory body in the state administration structure, the

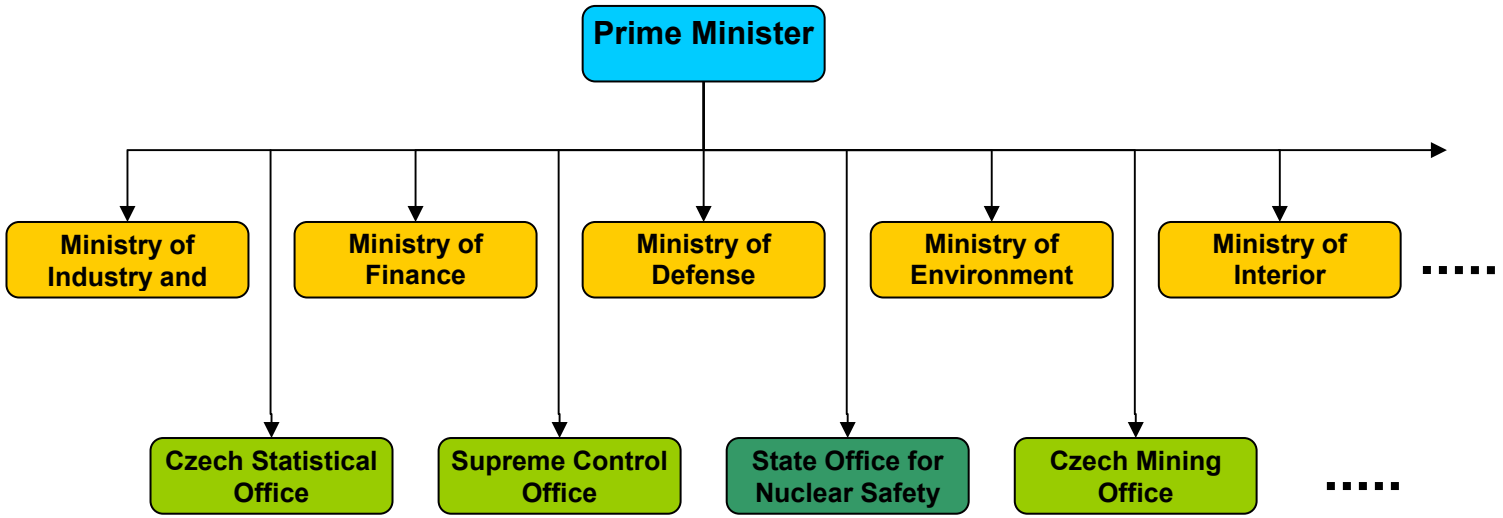
experts highlighted the fact that the SÚJB was independent not only "de jure" but also "de facto". The experts naturally also worded specific recommendations whose implementation may further increase the standard of supervision in the Czech Republic. The recommendations focused on special areas of supervisory activities, e.g. emergency preparedness practicing and further development in utilization of probabilistic assessment methods in nuclear safety. It was expressly stated, however, that these recommendations were mostly intended for the long-term development of the SÚJB.

The resulting reports from both IRRT missions have been published on the SÚJB website.

3.2 Statement on the implementation of the obligations concerning Article 8 of the Convention

Independent position of the SÚJB, as a regulatory body within state administration structure of the Czech Republic, its power and competency, financial and human resources fully conform to Article 8 of the Convention.

Pic. 3-1 Statute of the State Office for Nuclear Safety within the State Administration



Pic. 3-2 Organizational Chart of the State Office for Nuclear Safety

4. Responsibilities of the Licensee - Article 9 of the Convention

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

4.1 Description of the current situation

In accordance with the current legislation of the Czech Republic represented particularly by the Atomic Act, the principle of responsibility of a licensee for nuclear safety of a nuclear installation has been broken down into a number of partial responsibilities, which together represent the over-all responsibility of a licensee for nuclear safety. These partial responsibilities are specified particularly in Section 17 and Section 18 of the Atomic Act. The basic obligation of the licensee, i.e. to provide for nuclear safety, radiation protection, physical protection and emergency preparedness of its nuclear installation, is defined in paragraph 1, letter a) of Section 17. Other provisions subsequently define necessary obligations in respect to the nuclear safety assurance, e.g.:

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

One of the main tasks of the state supervision of nuclear safety is monitoring of fulfillment of and adherence to the above-mentioned requirements. The rights of inspectors of nuclear safety and radiation protection are defined, as mentioned above, in Section 39 of the Atomic Act. In agreement therewith, the inspectors check on compliance with the requirements for 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 fulfillment of all established obligations.

Dukovany NPP and Temelín NPP are, from the organization viewpoint, integrated into the Nuclear Power Division (NPD) of ČEZ, a. s., which has, as a licensee, the primary responsibility for nuclear safety of its nuclear installations. The licensee has its own inspection system in place to check the fulfillment of requirements of the Atomic Act. A Quality Assurance Program and detailed specifications of powers and responsibilities in other documents are used to guarantee review and observation of the approved working procedures and scheduled periodic tests.

Based on the system, in case of an event affecting nuclear safety, radiation protection, physical protection or emergency preparedness, the events important for nuclear safety are registered and investigated, and remedial measures are introduced to prevent their repeated occurrence. The licensee shall immediately communicate these events to the state body for supervision of nuclear safety. Non-significant safety related events are also the subject of investigation and in such cases the investigation results, including the adopted remedial measures to assure that the events do not repeat, are subsequently transmitted. The whole

process is regularly and systematically evaluated and monitored by SÚJB inspectors.

The level of nuclear safety, radiation protection, physical protection and emergency preparedness is continuously assessed using the system of internationally comparable indicators. The safety assurance is also subject of the external independent mission, for example performed by the IAEA and the WANO. Results of these assessments, which the state supervision does not take part, are transmitted to and discussed with the SÚJB.

The licensee continuously verifies and updates all documents, which represent the basis and condition for issuance of the license, in particular the Safety Report and safety analyses. These updates are submitted to the SÚJB for appraisal on regular basis.

To assure continuous supervision and complex awareness of the state supervision of situation on nuclear power plants, and to perform the de facto continual inspection activities, personnel of the state supervision of nuclear safety are permanently present at Dukovany NPP as well as at Temelín NPP – the so-called "resident inspectors".

As a part of cooperation with similar nuclear power plants currently in operation Dukovany NPP has an agreement with the Slovak plants – Bohunice NPP and Mochovce NPP. Based on the agreement there a periodic exchange of experience and knowledge associated with operational audits is performed by the partners, similar to the WANO Peer Review, or the OSART.

Another important obligation of the licensees is their liability for nuclear damage caused by operation of their nuclear installations (Section 33 of the Atomic Act).

4.2 Statement on the implementation of the obligations concerning Article 9 of the Convention

Current legal provisions dealing with the basic responsibility of licensees for nuclear safety in their nuclear facilities are defined in accordance with the 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 organizations 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

The principle of priority to nuclear safety has been incorporated into the Atomic Act. Chapter two of this Act establishes general conditions for the performance of activities related to the utilization of nuclear energy. Section 4, paragraph 3 of the Act unequivocally establishes that:

"Whoever performs practices related to nuclear energy utilization or radiation practices shall proceed in such a manner that nuclear safety and radiation protection are ensured as a matter of priority."

The above-quoted principle is contained in all legal regulations, which are related to the Atomic Act in the Czech legal system and break down into details its basic requirements (see chapter 2).

5.1.2 Implementation of principles established in the legislation

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

The ČEZ, a. s. company set strategic (short-term and long-term) goals for its nuclear power plants, which include, in order to achieve safe and reliable power and heat generation, an unequivocal obligation to assure nuclear safety and radiation protection. Safety requirements for nuclear installations shall be given top priority in the company and these requirements shall be viewed superior to production and commerce requirements. The system of adopted principles and measures responsibly and adequately protects the personnel, public and environment from the radiation hazard.

The main goals of the ČEZ, a. s. safety strategy are fulfilled by extensive use of safety culture principles, quality assurance principles and other nuclear safety principles (included in the internal control documents of the company) in accordance with the international standards, experience and recommendations and in accordance with the valid legislation of the Czech Republic. To achieve strategy goals (recording, integration and structured control of the mutual effort) all employees were and still are acquainted with this strategy in detail.

Another binding safety proclamation of the company is the basic philosophy for safety assurance as defined in the "Safety Policy of the ČEZ, a. s.", through which the company management undertakes to apply and observe the basic safety principles during all activities. The first obligation of the policy – "Safety is one of our basic priorities and it is an integral part of the company management" documents the company's responsible approach to safety.

The company, in its rules "Safety and Protection", defines the basic scope of power and responsibility as well as the method, in which the respective area of activities is ensured within the company. To accomplish these objectives, ČEZ, a. s. has developed a complex mechanism, which comprises control documents of different levels, a system of regular assessments and a system of inspections. While performing their assigned activities all

employees shall observe the rules so that probability of non-standard events occurrence is minimized. One of the tools for systematic assessment of the level of nuclear safety is a set of indicators, which characterize trends of the nuclear safety level and the radiation protection level in nuclear power plants during the past week, month, year. Through the regular evaluation safety reports, the company's managers thus obtain feedback for their further decisions.

To solve the most significant (principal) safety issues related to the operation of nuclear installations, advisory groups of managers operate on the individual management levels of the company. The individual advisory committees (Committee on the Safety of the ČEZ, a. s. Nuclear Installations, Committee on the Nuclear Power Division Safety and Safety Commission of the Nuclear Power Division) are made up of representatives of the decisive special departments and joint sections of the company as well as of invited specialists. The basic function of the above mentioned is to evaluate the safety level of nuclear installations and to identify the topical and potential safety related problems together with their assessment and subsequent recommendation for optimal solution proposals.

Since 2000 the ČEZ, a. s. company has implemented a progressive restructuring program aimed at improving the control level and making the economics of the plants operation more effective with the current requirement on keeping the minimum same safety level. This process, affecting significantly the organizational and personal areas, proceeds in a controlled way further to an exhaustive analysis and assessment of possible impact of the prepared change on the operation safety. A separate complex assessment has been developed for each planned change (according to requirements of the "Assessment of the Organizational Changes Impact on the Safety Level" methodology). The proposed changes (their safety related assessment) are submitted to the state regulatory body for appraisal before their implementation. All approved implemented changes are always subjected to an exhaustive safety related analysis in the specified intervals.

Supervision of nuclear safety

The Atomic Act defining the "priority to safety" principle represents for SÚJB a basic legal document for the performance of the state supervision of nuclear safety and radiation protection. As described in Chapter 3, all SÚJB activities, it's organizational structure and work procedures are governed by the said principle. The 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 the scope of its authority and competence, the SÚJB performs checks on observation of the "priority to safety" principle, as established by the Atomic Act, in the course of all activities related to the utilization of nuclear energy and performed by other subjects. All organizations which participate in design, manufacturing, construction and operation of nuclear power plants are subject to SÚJB inspections, which assess especially the management approach to safety related issues and how individuals performing safety related activities are motivated in respect to this issue.

Dukovany NPP – Communication with the general public

Since 1990 Dukovany NPP has been making substantial efforts to establish friendly and mutually beneficial relationships with the towns, municipalities and population in the region around the plant. Representatives and residents of municipalities living in the plant's vicinity and the general public have been allowed to visit the plants premises, including the interim storage of spent nuclear fuel, their questions and comments have been answered and they

have been informed about business activities and capital projects aimed at improvement of the plant's reliability, safety and performance. An information center of the plant opened in 1994 and on average it has been visited by nearly 30,000 people each year, including those coming from abroad. A systematic cooperation between the plant and basic and secondary schools and universities has been under way for a number of years.

The establishing and strengthening of mutual ties between the plant and neighboring municipalities includes a substantial financial support to improve their living conditions (development of water distribution systems, sewerage, waste water treatment plants, local roads, utilities, etc.) and support of various social organizations and institutions through sponsorship.

Credibility of the plant in the eyes of local population in respect to the plant's safety and reliability has also increased due to the established Civil Safety Commission, made up of representatives of local municipalities and with the authority to independently check the nuclear power plant and inform the general public about its findings. The residents may dial a well-known phone number at any time to obtain the latest information about the plant's operation. More information is available from the ČEZ - Dukovany NPP website. There is also the "Zpravodaj" bulletin informing the population in the region about the latest news from the plant and distributed in 40,000 copies to all households within 20 km from the plant.

Temelín NPP – Communication with the general public

Since 1993, apart from personal contacts with the mayors from the vicinity of Temelín NPP, there have been regular meetings between representatives of the Association of towns and municipalities of Temelín NPP region and ČEZ, a. s. Temelín NPP representatives. The meetings have been used to answer questions concerning mainly the plant's completion, its safety, environmental impacts, emergency preparedness issues etc., asked by representatives of local residents. Over the period of completion and commissioning of the plant, the meetings also included tours in the plant. Through their representatives the mayors receive all latest information from the plant in form of press releases, information materials and publications.

Modern methods of presentation and a number of interactive models in the information center of the plant, situated in a little castle Vysoký Hrádek and opened in the fall 1997, enable quality and pro-active information transmission to the visitors. There are "tailor-made" programs for different types of visitors, including general public, schoolchildren, students and various professional and specialized groups.

Every household within the emergency planning zone (13 km) receives the plant's information bulletin "Temelínské noviny". Articles in the bulletin are written in a popular form to introduce to the general public topical issues in the nuclear power industry, as well as topics dealing specifically with Temelín NPP, particularly its safety, environmental impacts, emergency preparedness, nuclear wastes disposal etc.

Media representatives are provided with the information at briefings and press conferences organized at Temelín NPP and through press releases regularly issued by the plant's spokesperson. After completion of each major commissioning stage media representatives are also permitted to tour the plant.

The latest information on Temelín NPP is also available on the ČEZ, a. s. website at www.cez.cz. The information is in Czech and German since the target group of readers is the German-speaking community. The site includes a "questions & answers" module. There are tens of questions already answered in the module, most of them coming from Austria.

5.2 Statement on the implementation of the obligations concerning Article 10 of the Convention

The principle of priority to safety, as established in Article 10 of the Convention, has been complied with in the Czech Republic.

6. Financial and Human Resources - Article 11 of the Convention

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

(ii) Each Contracting Party shall take 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 provision of nuclear safety enhancement at nuclear installations in the course of their operation

The Atomic Act establishes as one of the general conditions that any person performing or providing for practices related to nuclear energy utilization, shall have an implemented quality assurance system to the extent and in the manner set out in an implementing regulation (Section 4 paragraph 8). This is the SÚJB Decree No. 214/1997 Coll., on quality assurance in activities related to the utilization of nuclear energy and in radiation practices, and laying down criteria for the assignment and categorization of classified equipment into safety classes. Quality Assurance Programs for the activities being licensed shall be approved by the SÚJB.

Documentation of the licensee's – ČEZ, a. s. – quality assurance system includes the commitment to arrange for sufficient financial resources available for assurance of the safe operation of the company's nuclear power plants. This commitment is included in the company's Organization Rules. In connection with the ČEZ a. s. Safety and Quality Assurance Policy, the provision of sufficient resources for assurance of nuclear safety and personnel protection as well as environmental protection has been described in detail in the relevant control documents.

Safety maintenance and enhancement in the ČEZ a. s. Nuclear Power Division (NPD) is performed in the controlled manner in accordance with the elaborated regulations and programs. On their bases the business plans are developed subject to approval on the NPD and ČEZ a. s. management level. Further the individual projects are incorporated into the investment budgets of the company for the corresponding year. Funding of the individual projects is provided from the company's unrestricted sources.

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 management of radioactive wastes, including those generated at nuclear power installations, is regulated by Section four of the Atomic Act (Sections 24 – 31). The Section 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 "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, the Section 25 of the Atomic Act establishes as follows:

"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 radioactive waste and spent fuel disposal are, in accordance with the Atomic Act, deposited by the waste generators to a special Nuclear Account opened at the Czech National Bank. The Nuclear Account is administered by the Ministry of Finance, its means are part of the state financial assets and liabilities, and the utilization of which is decided by the government in accordance with the Act No. 218/2000 Coll., on budgetary rules, as amended.

The funds on the nuclear account may only be used for the purposes specified by the Atomic Act. The amount and method of payments to the nuclear account are specified by the Czech government decision, based on a proposal submitted by the Ministry of Industry and Trade. Radioactive Waste Repository Authority (SÚRAO) is founded in agreement with the Atomic Act by the Ministry of Industry and Trade to carry out activities related to radioactive waste disposal. Activities of the Radioactive Waste Repository Authority are funded by means of the Nuclear Account and its annual budget shall be approved by the government.

The radioactive waste management (as well as that of non-active waste, decontamination and technical issues of decommissioning) at ČEZ company's nuclear power plants is controlled by independent organizational departments within the safety and technical support section (i.e. outside the production section). The training of personnel is carried out within the framework of a uniform training system (see also chapter 7.1.3).

Decommissioning

The basic obligations of a licensee as specified in Section 18, paragraph 1, letter h) of the Atomic Act include the obligation to evenly create financial reserves for the preparation and actual decommissioning of nuclear installations. The amount of this reserve shall be established based on the decommissioning technology approved by the SÚJB and based on the estimate of the costs for given decommissioning technology verified by Radioactive Waste Repository Authority. The method of creating reserves is governed by a separate legal regulation issued by the Ministry of Industry and Trade of the Czech Republic. The creation of reserves is controlled by Radioactive Waste Repository Authority. Currently, proposals for the decommissioning method have been already approved for the Dukovany NPP and the Temelín NPP. The corresponding financial reserves are created in accordance with the legal regulations for both nuclear power plants operated by the ČEZ, a. s. company.

The ČEZ, a. s. decommissioning documentation is being prepared by a multi-professional team, consisting of experts from the Nuclear Power Division, whose knowledge and experience may be used during the decommissioning preparation. From the organization viewpoint the team is compiles of representatives from the Economics and Trade section, Engineering section and the Safety section. The team deals with technical, financial, investment and organizational issues of the decommissioning, including provision of the appropriate human resources. Appointing of the team and all activities carried out in this area, have been in compliance with the quality assurance requirements adopted by ČEZ, a. s. and established in the quality assurance program for nuclear activities.

Insurance

The Czech Republic joined the Vienna Convention on Civil Liability for Nuclear Damage and Joint Protocol relating to the Application of the Vienna and Paris Conventions in 1995 (declared in the Collection of Laws under No. 133/1994 Coll.).

At the time when no legislative standard was in place (1994-1997) issues were covered by a governmental statement (guarantee). In 1997 the Atomic Act came into effect establishing the liability of operators of nuclear installations for damages and charging them with the obligation to obtain insurance (Sections 32-38). The liability of operator of major nuclear installations has been set down by the Act at 6 billion CZK (about 200 million euro). The operator is obliged take out liability insurance for nuclear damage caused by the nuclear installation operation at the minimum of 1.5 billion CZK (about 50 million euro).

The insurer for nuclear risks in the Czech Republic is the Czech Nuclear Pool associating the most significant insurance companies acting on the Czech insurance market. This pool is a member of the international association – Nuclear Pools Forum. Based on inspections performed by international insurance pools both Czech nuclear power plants have been insured for the liability in accordance with the Atomic Act as well as for property: Dukovany NPP since 1997 and Temelín NPP since 2000.

The Czech Republic, a pro-active participant in international negotiations in this area, signed on June 18, 1998 the Protocol to Amend the Vienna Convention on Civil Liability for Nuclear Damage and also the new Convention on Supplementary Compensation for Nuclear Damage. The Czech Republic has not so far ratified these international instruments.

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 ionizing radiation may be utilized. The Section 17, paragraph 1, letter i) of the Atomic Act introduces the following general obligation to the licensee:
"entrust performance of the specified activities only to such persons who fulfil conditions of special professional competence and are physically and mentally sound".

According to Section 18, paragraph 1 the licensee is also obliged to:
"provide a system of training and verification of competence of personnel in accordance with the importance of the work they perform".

Preconditions for performance of activities directly influencing nuclear safety are established by the provision of Section 18, paragraph 3 of the Atomic Act. Such activities may only be performed by physical entities, which are physically and mentally fit, with professional competence verified by the State Examining Board and to whom the SÚJB has granted an authorization for the concerned activities, upon an application by the licensee.

Professional training of the selected personnel of nuclear installations may, according to Section 9, paragraph 1, letter n) of the Atomic Act, be organized by a physical or legal entity only based on a respective license granted by the SÚJB. Documentation required for the issuance of such a license is listed in an Appendix to the Atomic Act.

The SÚJB Decree No. 146/1997 Coll. (as amended by the SÚJB Decree No. 315/2002 Coll.), in compliance with the quoted provisions of the Atomic Act, specifies activities with immediate impact on nuclear safety and activities particularly important for radiation

protection, requirements for qualification and professional training, method of verification of special professional competence and authorization process of the selected personnel, as well as the format of required documents to obtain a license for training of selected personnel.

The above-mentioned legal regulations have been complemented with the Safety Guide [6-1] issued in April 1994 by the SÚJB, covering professional education and training of personnel for the performance of work activities (positions) at Czech nuclear installations. The Guide specifies criteria and provides methodical guidelines for management and execution of training of employees of nuclear installation operators and employees of legal and physical entities whose activities (positions) at nuclear installations are important for nuclear safety, with the objective to minimize risks caused by human failure.

Application of legislative requirements to the holders of licenses for operation or construction of nuclear installations

The only guarantor of personnel training, from the Atomic Act viewpoint, within the ČEZ, a. s. is the Preparation and Training section, which is a part of the Nuclear Power Division. The main purpose of this section is to perform professional training of personnel for both power plants as well as for external suppliers. The section is also, in accordance with the internal control documents, responsible for the establishing of a concept, strategy and system of professional training of personnel for all nuclear activities in the ČEZ, a. s. company.
Within the meaning of personnel training the activities are carried out in three training and educational centers:

- Training and Educational Center in Brno (ŠVS Brno)
- Training and Educational Center in Dukovany NPP (ŠVS EDU)
- Training and Educational Center in Temelín NPP (ŠVS ETE)

The respective managers at all management levels are responsible for the professional competence (qualification) of their subordinates. Principles governing the process of personnel professional training in respect to nuclear activities are described in the control document "Assurance of competence for performance of activities in the nuclear installation".

Both the nuclear power plants have a common documented system of personnel training. In respect to nuclear activities the system represents a complex of mutually related activities, systematically implemented in compliance with the legal regulations valid in the Czech Republic and with internal control documents.

The Preparation and Training section, as a guarantor of the process, permanently keeps, in accordance with the provision of Section 9, paragraph 1, letter n) of the Atomic Act, the validity of the SÚJB license for the training of nuclear installations personnel as well as of selected personnel of workplaces with ionizing sources.

The concept of qualified personnel training of ČEZ a. s. - NPD

The Nuclear Power Division, as a representative of the nuclear installation operator, is required to assure such professional competence and special professional competence of its employees so that nuclear safety and radiation protection level at the nuclear power plant is not compromised. For each position the requirements for education, professional experience, health and psychical fitness, probity and especially for continued professional training of the personnel, before they start to perform their respective activities are established. The objective of personnel training is to assure that each individual possesses necessary knowledge, skills and habits required for achieving, maintaining and developing the relevant professional competence. The fulfillment of this objective is verified by examinations and

then formally confirmed by authorizations issued by the employer to perform the concerned activities.

The personnel training system at the NPP is closely related to the system of education in the Czech Republic. A significant proportion of employees are university graduates (35%) or technical high school graduates (47%). For this reason the training process at the nuclear power plant focuses on provision of additional special knowledge in the area of nuclear power plants, acquisition of practical professional knowledge and skills necessary to perform the concerned work. Special attention is paid to the units´ main control rooms operators (selected personnel). Their training is always concluded with examinations before the State Examining Board (for more details on the State Examining Board see Chapter 7).

The *personnel training* as a process consists of *specific training* and *professional training.* The specific training is further divided into *basic training* and *regular training.* The professional training includes *specialized training* and *periodic training.*

The process of personnel training starts with recruitment and hiring. New workers are always selected according to the criteria established in the internal instruction "Personnel Searching and Selection". The selection process includes verification of health and psychic fitness of the employees for their future positions. The personnel department of the Nuclear Power Division is responsible for this area together with personnel section of the Headquarters.

The training consists of professional and effective training of NPP personnel and suppliers. The responsible department puts the personnel training system into practice, implements this system and evaluates the given process. The department is fully responsible for application of new training techniques and means in order to improve the efficiency of personnel training.

The personnel section administers the central files of personnel qualification maintained for each work activity performed at all departments of the nuclear power plant.

Basic, periodic and professional training of personnel of ČEZ-NPD

The purpose of *basic training* is to acquire or to improve special professional capability necessary for performance of a given work activity. The basic training is obligatory for each employee who performs a work activity important for nuclear safety or radiation protection. The basic training shall be provided to all new employees and to the employees trained for different work.

The employees are assigned to one of the training groups according to their work activity and professional specialization. From the viewpoint of nuclear safety the five following groups are defined, for:

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

From the viewpoint of radiation protection, three groups are defined in agreement with the SÚJB Decree No. 307/2002 Coll., on radiation protection:

- selected personnel,
- radiological personnel,
- other employees.

Training is carried out in compliance with the approved training programs prepared by the

nuclear power plant in cooperation with the training guarantor (Preparation and Training section). There are the following forms of basic training, depending on the training program, training group, specialization and requirements of the qualification standard/schedule:

- theoretical/classroom training,
- secondment at the nuclear power plant,
- training on a full-scale simulator,
- examination to obtain a Certificate,
- training for a specific position,
- examination to obtain an Authorization,
- Authorization for a work activity.

The individual mutually linked-up parts of theoretical and practical training are combined into modules, and the whole duration of the 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 as required to carry out his/her work. Each employee who performs an activity important for nuclear safety or radiation protection is obliged to undergo periodic training.

There are the following forms of periodic training, depending on the training program, training group, specialization and requirements of the qualification schedule:

- theoretical/classroom training (training days, training dealing with industrial safety, fire protection, emergency preparedness, access to controlled area, etc.),
- training on a full-scale simulator,
- training and examination to obtain Authorization.

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

The purpose of *professional training* is to maintain, update, deepen or improve the specific professional competence of an employee as required to carry out his/her work. Each employee whose work involves nuclear activities is obliged to undergo the professional training. The exposure to professional training is very important for employees who perform activities important for nuclear safety or radiation protection since the training represents a precondition for continuing validity of the Authorization. Duration of this form of training depends on the type of work activity and may be carried out as a one-off training or long-term course.

Training of Dukovany NPP personnel at a simulator

A full-scale simulator VVER 440 is used for basic and periodic training of Dukovany NPP personnel – a replica of the main control room situated at the power plant site.

The replica-type simulator is a high-fidelity copy of the operating personnel workplace in the main control room, with all counters and operating panels, including all instrumentation and information system screens placed therein. The simulation of technology, technological processes as well as the control and management system is performed on a modern system based on SILICON GRAPHICS computers using simulation software supplied by the GSE and OSC companies.

The simulator also includes a separate workplace for the instructors, with the so-called instructors station, from which the instructors control the simulator and manage the training (set-up the initial reactor condition, enter defects of the equipment and on operator's request simulate manipulations performed on the real unit by the operating personnel etc.).

Communication between the training main control room staff and the instructor is via a closed circuit telephone line. The installation enables the instructor to listen to the main control room personnel and to record their actions with a camera recording system.

Further there is a display version of the simulator to be used for training, which displays results of the computing model of the main control room in a virtual form on the monitors. Within the project for I&C system restoration the simulator model is modified and the training tool for reorientation training of the operating personnel is thus developed for the newly implemented I&C systems.

Training of Temelín NPP personnel at a simulator

The concept of training provided to the qualified personnel at Temelín NPP essentially follows the pattern used at Dukovany NPP.

The training of Temelín NPP personnel is performed at a full-scale VVER 1000 simulator on the site.

The VVER 1000 full-scale simulator at Temelín NPP was put into operation with a sufficient lead before the first fuel loading. The workplace of operators has been designed identically with the real main control room and the construction part of the simulator hall has been adjusted accordingly. The simulation of technology and technological processes is performed on a modern system based on SILICON GRAPHICS computers. The information and control system of the simulator for operators is a customized WDPF system supplied by the WESTINGHOUSE Company. This company also supplied counters and panels, including instrumentation, for the full-scale simulator; identical counters and panels are used in the main control room.

As with the VVER 440 simulator, training on this simulator is managed by the instructors and the communication and recording equipment is included.

A display version of the VVER 1000 simulator has also been developed at the Temelín site, which is currently used both for training and for engineering purposes.

Organization and provision of training at simulators

The operating personnel training at simulator runs according to the time schedule harmonized with the operations needs in accordance with the programs approved by the SÚJB, including examinations at the simulator.
Training instructors at the simulator at both sites are highly qualified personnel of the Preparation and Training section having experience as a reactor unit manager and supplementary educational knowledge.

Scenarios of all activities trained in the given course are prepared, tested and approved for training implementation. The scenarios cover the following operating modes of the power plant reactor building technology:

- unit start-up from cold state to nominal power,
- unit operation at various power output levels,
- unit shutdown from the nominal power to cold state,
- liquidation of error conditions of the unit,
- liquidation of emergency conditions of the unit.

The scenario contains objectives of the trained task, description of the unit initial state, expected procedure of the personnel when solving task, method to simulate tasks and success-rate criteria. In addition, in case of basic training the scenario contains theoretical analysis.

Valid operating procedures are available at the personnel workplace to solve tasks in the same extent as in the real main control room.

When using simulators the central attention is paid to the simulator-based training of Dukovany NPP and Temelín NPP personnel, however, the simulators are also used for training of personnel of the Technical Support Centers as well as of other personnel of operating and technical departments.

Simulators are also successfully used for validation of operating procedures, preparation of tests as well as for other analytic activities.

Professional training provided to employees of external suppliers

The process of personnel training in the case of employees of external suppliers is, as well as that of the plant's own personnel, comprised of basic training for personnel performing activities with indirect impact on nuclear safety. Requirements for the professional competence of external personnel depend on the ČEZ, a. s. - NPD needs for providing activities, especially activities related to maintenance and repair of the equipment. The system is based on fundamental assurance of professional qualifications by the supplier, completion of professional training in accordance with the ČEZ, a. s. - NPD requirements and personnel involvement in the qualification groups. Types of training obligatory for individual employees are established using an expert procedure in compliance with ISO standards, the SÚJB Decree No. 214/1997 Coll. and relevant international recommendations. Detailed requirements for each type of training are specified in the internal control documents. The external suppliers are required to have their training system and qualification assurance described in their own documents, including a method to prove fulfillment of requirements for the professional competence.

Evaluation of training

Evaluation of training and verification of personnel capability is a precondition needed to establish efficiency and effectiveness of the training programs used for individual forms, stages and types of training. Results of such evaluations provide a feedback through which the contents and scope of the professional training are modified aimed at improving its effectiveness. The basic information sources used for a systematic evaluation of the professional training include:

- direct verification of personnel knowledge,
- indirect verification of personnel competence,
- evaluation of the standard of training processes by managers, trainees, instructors,
- evaluation of training programs, etc.

6.2 Statement on the implementation of the obligations concerning Article 11 of the Convention

The provision of financial and human resources for nuclear safety assurance in the Czech Republic is in compliance with the 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

The Atomic Act establishes in Section 17, paragraph 1, letter b), as one of the general obligations of a licensee, the obligation to:

"assess in a systematic and comprehensive manner the fulfillment of conditions set in Section 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 further specified in the SÚJB Decree No. 106/1998 Coll., on nuclear safety and radiation protection assurance during commissioning and operation of nuclear facilities, in which the Section 14 imposes upon the licensees the obligation to review and modify the operating procedures so that they conform to the current level of science and technology, and at the same time reflect the operational experience and practice. The assessment of human factor impacts on operation safety is one of the basic components of the process.

Assessment of human factor impact at Temelín NPP and Dukovany NPP

The monitoring of human factor impact on the occurrence and development of operational events is performed by the Temelín NPP and Dukovany NPP Nuclear Safety departments and is in accordance with the relevant control documentation valid in the respective NPP. The human factor is understood as a significant safety element and permanent attention is paid to its possible failure. The purpose of human factor evaluation is to assess the level of various human behavior impacts on performance of activities related to technological process as well as on safe operation of the nuclear power plant. The importance of human factor as a significant safety factor is taken into account in the methodology of operational events importance evaluation according to the INES international scale. Human failure is one of the aggravating aspects, which may cause an enhancement of classification degree for the evaluation.

The results of regular assessments of operational events in individual nuclear power plants have proven that a significant proportion of these events were caused by one or another form of human failure, either directly operator's error during performance of particular activity or human failure in other fields (documentation, design, etc.).

To investigate the causes of human failure impact on the occurrence and development of operational events the nuclear power plants apply the internationally recommended ASSET (Assessment of Safety Significant Events) and HPES (Human Performance Enhancement System) methodologies. Direct and root causes of the individual events are classified as equipment failures, documentation deficiency or humane error. In case the human factor impact is identified during the causes determination, detailed investigation takes place in individual NPPs, resulting in elaboration of human factor impact analysis for the respective

event. This analysis is an integral part of the overall analysis of the respective operational event.

Employees involved in the investigation of causes of human failure have been trained in the ASSET and HPES methodologies. Human factor impact is monitored within all NPP departments, however, the maximum emphasis is put on monitoring of human factor in respect to the shift operating personnel.

The causes of human failure are assessed and confirmed by the Failure Commission at the plant (each NPP has its own Commission). Based on the respective analysis corrective measures are imposed aimed at effective ensuring that the same deficiencies in human behavior do not repeat and eliminating thus repetitive events.

One of the means for human failures prevention are training days regularly organized for selected categories of the NPP personnel. These training days include information on selected operational events, based on specialization of the trained personnel and with regard to the cases of human failure.

Obligatory psychological examination is applied for selection of personnel with the minimum risk of failures caused by carelessness or negligence.

To minimize the human factor impact in the course of performing activities the NPP has been continuously developing a system of operating procedures to guide each operator and warn about potential risks, while providing absolutely unambiguous description of activities. Selected manipulations are described in form of check-lists.

Human failure causes, including evaluation of trends of human factor impact, are in both NPPs regularly evaluated in the annual reports on operational events, together with factors contributing to human failure.

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 at regular meetings to discuss conclusions of the plant's so-called "Failure Commission" (for more details see Chapter 14.1.6) with the operator. On monthly basis the SÚJB prepares a report on results of such meetings. The reports are subsequently evaluated from the viewpoint of feasible corrective measures initiated by the regulatory body.

A system of verification of special professional capability for selected personnel of nuclear installations is instrumental in the prevention of human error occurrence. In accordance with the Atomic Act (see SÚJB competence in chapter 3.1) the SÚJB shall establish for this purpose state examining boards and identifies activities with immediate impact on nuclear safety. Verification is carried out in form of an exam before the state examining board.

This exam consists of a theoretical written and oral part, and a practical part, including examination at a simulator. The state examining board may decide to skip the practical part in the case of authorization renewal. A failed exam may be repeated by the applicant within a 1 - 6 months period whereby the specific date shall be determined by the state examining board. Under a respective implementing regulation an individual who has successfully passed the exam in front of the state examining board is granted a selected personnel authorization by the SÚJB for a period of 2 to 8 years.

7.2 Statement on the implementation of the obligations concerning Article 12 of the Convention

The requirements under Article 12 of the Convention, on evaluation of possible human factor impact on operational safety over the whole service life of nuclear installations, are complied with in the Czech Republic.

8. Quality Assurance - Article 13 of the Convention

Each Contracting Party shall take appropriate steps to ensure that quality assurance programs are established and implemented making sure that specified requirements for all activities important for nuclear safety are met throughout the nuclear installation service life.

8.1 Description of the current situation

8.1.1 Quality assurance legislation

The Atomic Act establishes general conditions for the performance of activities related to the utilization of nuclear energy, radiation practices and actions to reduce radiation exposure. The provisions of § 4 paragraph 8 establishes as follows:

„Any person performing or providing for practices related to nuclear energy utilization or radiation practice, except the activities according to § 2 letter a) paragraphs 5 and 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 organizational 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 in this case SÚJB Decree No. 214/1997 Coll., establishing basic requirements for the quality assurance of classified equipment (items) and on their safety classification, giving details of:

- requirements for the introduction of a quality system covering activities specified by the Atomic Act,
- requirements for such a quality system,
- requirements for the quality assurance of classified equipment (items) in respect to their safety classification,
- requirements for the content of quality assurance programs,
- criteria for classification of classified equipment into safety classes,
- scope and format of the List of Classified Equipments

Pursuant to § 13, paragraph 5 of the Atomic Act, a license to be issued by SÚJB for specified activities in the utilization of nuclear energy and ionizing radiation shall be conditional upon an approved quality assurance program for the licensed activity (see chapter 3.2.1).

8.1.2 Quality assurance strategy of the licensee - ČEZ, a. s.

The first concept of the new business strategy was approved at the company's general meetings in July 1995.

This document enabled to guide the company business, to communicate to the company bodies and employees the idea about the basic focus of the company in a changing business environment and to create conditions for a sustainable and successful development of the company on a long-term basis. The general meeting of ČEZ, a. s. in June 1999 approved an updated version of the Concept of the Business Activity until 2005, which is based on the company mission: to reliably meet the demands of customers for electric power and related services, while keeping competitive prices and protecting the environment.

The concept defines the goals to be achieved by the company within the implementation of its

mission – among other things also:

- to have qualified employees accepting the required performance and quality standards, capable and willing to adjust themselves to the changes,
- to provide long-term sustainable development of the company, by increasing efficiency of costs management, risk management and quality management,
- to be a demanding, recognized and sought-after partner of its suppliers, by using a system of suppliers assessment.

The goal of the company management strategy is to integrate safety, environment, personnel protection and quality into a uniform management system providing a framework for high reliability, efficiency and credibility of the company management.

In 1997, the quality concept was extended with the commitment of the Board of Directors to continually improve the profile of ČEZ, a. s., as a company consistently meeting all its obligations in respect to the environment. The responsibility for quality concept implementation rests with the executive company management and its managers. The performance of working obligations by employees is in compliance with the quality system and accompanied by continual efforts to improve all the processes.

In December 2000 the company issued revised the Manual of Nuclear Activities as a general document to replace the following documents issued earlier: Quality Assurance Programs, particularly the Top-level QA Program and the QA Program For Nuclear Activities. The manual also covers the safety policy, environmental policy and policy of ČEZ, a. s.

ČEZ, a. s. introduced and documented the quality system, taking into account the obligations published in the company's Quality Policy, in order to assure the processes and activities within the scope of the above mentioned nuclear activities. This quality system is designed to carry out the assurance of processes and activities related to nuclear safety in a controlled and organized way, fully within the limits of the Atomic Act and its implementing decrees, including SÚJB Decree No. 214/1997 Coll. The requirements of the quality system are applied in a structured approach according to the relevance of individual processes and items for the nuclear safety and radiation protection.

Further improvement of the quality system was based on the objectives of ČEZ, a. s. management to introduce complex quality control. The improvement focused on the amended ISO standards of the series 9000:2000, issued on December 15, 2000. The company provides necessary human, material, financial, information and other resources for the introduction and continual improvement of the quality management system.

The quality system currently introduced in the nuclear are, fulfils not only the requirements of the ČSN ISO 9000 set of standards, but also the ČSN ISO 14000 set of standards and highly observes IAEA recommendations published in the Safety Series 50-C/SG Q.

An example of the company's approach to the environment are the results achieved by both the NPPs as well as the gradual introduction of ISO 14000 series standards at all plants operated by ČEZ, a. s., including their subsequent certification carried out at Dukovany NPP in 2001 and being under completion at Temelín NPP.

During the period 2000 to 2002 the quality system was gradually rationalized in line with the development of the company ČEZ, a. s.; the activities were redefined. The control tools were modified, especially the system of documents control and their creation. This means, in the area of nuclear activities, to transform the organizational structure of the company, which would, among others, result in integration of the organizational structure of both nuclear power plants (Dukovany NPP and Temelín NPP), while keeping, or improving, the strategic

goals within this area. The maintenance and development of safety levels, reliability and protection of personnel as well as the environmental protection, improvement of competitiveness (in terms of costs) and acceptability of nuclear energy by public, which recently relates to the construction of intermediate storage facilities or spent fuel storage facilities, are concerned in particular.

The problems related to the quality system in the nuclear area are currently integrated into the company management system.

The 1st stage of the organizational change was implemented within the company ČEZ, a. s. as at January 1, 2003. The Nuclear Power Division (NPD) was established, which includes the uniform center for the control of nuclear activities as well as some common control departments – sections (e.g. Control, Human Resources, and Economics) subordinated thereto. Dukovany NPP and Temelín NPP remained separate organizational units. The 2nd final stage of the organizational change of NPD was implemented within the company ČEZ, a. s. as at January 1, 2004, leading to another centralization of the performance of nuclear activities. In this connection, with respect to specified basic areas for the activities, a new system of control documentation is being developed. The transfer to a new system of documents control of the quality system is assured to be continuous and progressive, and to fulfil, in every moment, the requirements for quality assurance of activities important from the nuclear safety point of view.

8.1.3 Quality assurance programs for all nuclear installation service life stages

ČEZ, a. s. quality system is described and determined by a system of documents control. The system of control documents consists of:

- strategic documents (e.g. Quality Policy, Safety Policy, etc.) - Ist level,
- control documents (rules, directives, procedures, orders from the Director General and the Executive Director) - IInd level,
- working documents (e.g. methodology, operating instructions and technological procedure) - IIIrd level.

Working outputs – records (documentary output, document used for justification, design documentation, drawing, etc.) are an internal part of the documentation of ČEZ, a. s. quality system. NPD normative documents include the directives and procedures only.

The Quality Assurance Programs are developed by ČEZ, a. s. in order to assure nuclear quality, defining the quality system of the licensee, processes and activities involved, including definition of the responsibilities of the licensee and suppliers. The Quality Assurance Programs have a character of licensing documents using the above-mentioned set of control documents for the definition. The Quality Assurance Programs are elaborated in accordance with the requirements of § 32 of SÚJB Decree No. 214/1997 Coll., issued by the SÚJB for individual licensed activities within the meaning of §9 of the Atomic Act.

Pursuant to the provisions of § 13, paragraph 5 of the Atomic Act the company ČEZ, a. s. has Quality Assurance Programs approved by SÚJB for the licensed activities during the individual stages of nuclear installation service life (see chapter 8.1.5).

In connection with the establishment of a new organizational division – Nuclear Power Division, within ČEZ, a. s. as at January 1, 2003, the Quality Assurance Program of NPD was submitted and approved by SÚJB, as one of the documents used for implementation of this organizational change within ČEZ, a. s.
By now, more than 100 Quality Assurance Programs have been developed and approved for NPD, mostly for the licensed activities, execution of reconstruction and other changes.

The Quality Assurance Program, related to the operation at Dukovany NPP, i.e. reactor units, related buildings, intermediate storage facility of spent fuel and other items (products, activities and relations) specified in the Quality Assurance Program, is elaborated. This Quality Assurance Program was developed to assure that the requirements specified in the SÚJB Decree No. 214/1997 Coll., on quality assurance in activities related to the utilization of nuclear energy and in radiation practices, laying down criteria for the assignment and categorization of classified equipment into safety classes, were taken into account in the quality system of the licensee. The structure of the Quality Assurance Program is selected in respect to the structure of basic activities determined within ČEZ a. s. The last revision of this document was approved by the SÚJB decision of December 22, 2003.

The elaboration of the Quality Assurance Programs in agreement with the Atomic Act was commenced at Temelín NPP before the beginning of the active testing of unit 1 in 2000 – for the commissioning stages of the nuclear installation.

The Quality Assurance Program for licensed activities is currently elaborated for the nuclear safety, radiation protection, physical protection and emergency preparedness:

- active testing – trial operation of Temelín NPP units 1 and 2
- restart of a nuclear reactor to criticality following a fuel reload.

The Quality Assurance Program is technically arranged accordingly to the Quality Assurance Program of production at Dukovany NPP. The last revision was approved by the SÚJB decision of December 22, 2003. The document is correspondingly revised before the commissioning of both units. This revision is the subject of SÚJB assessment. This Quality Assurance Program is expected to be approved in July 2004.

The Quality Plans of suppliers of components, systems and services with an influence on the nuclear safety and radiation protection of nuclear facilities relate to the Quality Assurance Program for licensed activities.

8.1.4 Application and evaluation of quality assurance programs efficiency

ČEZ, a. s., has established responsibilities for the control and verification of quality for all processes and at all levels. Responsibilities, in relation to equipment quality and process verification, are described in the relevant documents, which are an integral part of the documented quality system. The Manager for Control and External Relations is responsible for the development of the quality system within the Nuclear Power Division and co-ordination of its implementation, for the monitoring and evaluation of its effectiveness as well as for the improvement of productivity and quality management with the information support for the control of processes and activities, including quality assurance in accordance with the Atomic Act.

Responsibilities for the actual implementation rest with all managers throughout the company. Each employee is responsible for the quality of his/her work. Individuals who perform inspection and verification activities have adequate authority to identify discrepancies and, if necessary, to require remedial measures to be taken. The required level of quality is verified by other employees than those performing the inspection and verification activities. All company employees are encouraged to submit proposals on upgrading and modifying the quality system.

Regular training of the company employees is understood as an investment in quality. A uniform training program for ČEZ employees at all management levels is used in the area of quality assurance and quality improvement. The training program for the management and other employees is based on the ČEZ, a. s. quality concept. The training program is aimed at

achieving general understanding of the quality system and all its tools and methods by employees in order to involve them in the process of quality assurance and quality improvement and make them participate in the development, implementation and improvement of the quality system.

At the end of each calendar year the quality system efficiency within NPD is assessed and the system is subsequently updated. Managers at all levels periodically evaluate all processes and procedures within their responsibility with the objective to review their actual condition and efficiency.

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

8.1.5 Current quality assurance practices applied by the state regulatory body

The SÚJB, in accordance with § 39 of the Atomic Act, checks compliance by the licensees with the Atomic Act, including the quality assurance requirements mentioned above. Whenever it is deemed necessary, the inspection activities are extended to include the subcontractor. The inspection activities focus both on the system and on the quality assurance of particular selected items. The SÚJB unit primarily performing this activity is the division for assessment of nuclear installations (see the SÚJB Organizational Chart - Fig. 3-2).

In compliance with the Atomic Act SÚJB approves quality assurance programs for nuclear installations dealing with:

- siting,
- design,
- construction,
- individual stages of commissioning,
- operation,
- start-up after refueling,
- reconstruction and other changes with a potential impact on nuclear safety, radiation protection, physical protection and emergency preparedness,
- decommissioning,
- management of ionizing radiation sources
- radioactive waste management,
- radioactive material management,
- training of selected personnel.

In accordance with the Atomic Act an approved quality assurance program is one of the preconditions for the issue of a license for the activities specified in § 9, paragraph 1 (see chapter 3.1.2). Criteria for the assessment of quality assurance programs are established in SÚJB Decree No. 214/1997 Coll. and other binding regulations and standards.

The SÚJB also approves the List of Selected Items, a document listing items important from the viewpoint of nuclear safety, divided into three safety classes in accordance with the criteria specified in Appendices to SÚJB Decree No. 214/1997 Coll., which are in accordance with IAEA criteria.

To issue a license for a nuclear installation siting SÚJB shall consider the following, as part of the initial safety report:

- quality assurance assessment for the siting,

- quality assurance method in the preparation for construction,
- quality assurance principles for the following stages.

To issue a license for the construction of a nuclear installation SÚJB shall consider the following, as part of the initial safety report:

- quality assurance method in the preparation for construction,
- quality assurance method in the construction implementation,
- safety assurance principles for the following stages.

For the approval for first fuel loading, SÚJB shall consider quality evaluation of the selected items, as part of the Pre-Operational (Final) Safety Report.

8.2 Statement on the implementation of the obligations concerning Article 13 of the Convention

The current legislation of the Czech Republic and its practical application guarantee that quality assurance programs are developed and implemented, making sure that all specified requirements for all safety related activities will be fulfilled over the whole period of the service life of a nuclear installation. The requirements specified in Article 13 of the Convention are fully complied with.

9. Safety assessment and verification - Article 14 of the Convention

Each Contracting Party shall take 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 experience from operation and significant new safety information, and reviewed under the authority of the regulatory body;

(ii) verification through analyses, surveillance, testing and inspection is carried out to check on whether the physical state and operation of a nuclear installation continually comply with its design, applicable national requirements and operational limits and conditions.

9.1 Description of the current situation

9.1.1 Licensing process and associated analyses during the project's individual stages (siting, design, construction, operation)

The licensing process legislative framework is defined by Act No. 50/1976 Coll., on land planning and construction regulations (the Civil Construction Act), the Atomic Act and their implementing regulations.

In the case of a nuclear installation construction, the Civil Construction Act established three-stage procedure comprising a site decision (siting), construction permit and operating license (permanent operation). Issuance of these resolution/permits is within competence of the respective local department of planning and building control. The resolutions are conditional upon positions issued by specialized regulatory bodies, including the SÚJB. For more detailed information see chapter 2.1.2.

The Atomic Act establishes the way of utilization of nuclear energy and ionizing radiation, as well as conditions for the performance of activities related to the utilization of nuclear energy and radiation practices. A precondition for the performance of such activities is a SÚJB license to be issued in an administrative procedure, which is independent of the above-described procedure required under the Civil Construction Act. The Atomic Act explicitly forbids launching siting, construction, operation and other activities at nuclear installations, requiring the SÚJB license, before the respective SÚJB license becomes legally effective. For more details see chapter 3.1.2.

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

According to the provisions of Section 17 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 licenses), asses it in a systematic and comprehensive manner from the aspect of the current level of science and technology, and ensure that results of such assessments are translated into practical measures. The verification/assessment shall be documented. The content of the documentation is specified in the Appendix 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 17, 18 and 19 of the Article.

The implementing regulations complement the Atomic Act to establish basic criteria for nuclear safety assessment of a nuclear installation during different stages of its service life.

The following are particularly concerned:

- ***SÚJB Decree No. 215/1997 Coll.***, on criteria for siting nuclear installations and very significant ionizing radiation sources,
- ***SÚJB Decree No. 195/1999 Coll.***, on basic design criteria for nuclear installations with respect to nuclear safety, radiation protection and emergency preparedness,
- ***SÚJB Decree No. 106/1998 Coll.***, on nuclear safety and radiation protection assurance during commissioning and operation of nuclear facilities, which defines and establishes particularly the following:
  - individual stages of commissioning,
  - requirements for the content of the commissioning programs,
  - requirements for the contents of Limits and Conditions for safe operation.
- ***SÚJB Decree No. 214/1997 Coll.***, on quality assurance in activities related to the utilization of nuclear energy and in radiation practices, establishing criteria for the classification and categorization of specified installations into safety classes.

As described below, practical application of the requirement to perform systematic and comprehensive assessment of a nuclear installation to check on its continual compliance with its design, applicable safety requirements in the valid national legislation and with Limits and Conditions includes in particular:

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

9.1.2 Continual monitoring and periodic assessment of nuclear safety at nuclear installations

Continuous monitoring of the Dukovany NPP and Temelín NPP units' nuclear safety performed by the operator focuses in particular the observation of the Limits and Conditions for safe operation.
This activity is performed both by personnel of the departments responsible for such activities and by specialists of the operational safety department in both NPPs. Personnel of the operational safety department is responsible for independent verification of the fulfillment of test completion criteria during operation and after maintenance, before equipment after maintenance is ready for operation.

Independent inspections of compliance with additional requirements are performed during outages, dealing with the procedures of works and manipulations on primary circuit technological equipment. The inspections are also performed by personnel of the nuclear safety departments of both NPPs as well as by the managers of other departments whose personnel or, if applicable, contractors, carry out work during the outages.

The information on nuclear safety assurance is presented both in textual and graphic forms. The latter form uses indices containing information about safety systems reliability, conditions of certain equipment in general, environmental impact of NPPs operation and about compliance with the established principles for the given area (fire protection, industrial safety).

For the day-to-day assessment Dukovany NPP as well as Temelín NPP use a risk monitor

which evaluate the risk of a core meltdown (damage frequency) probability, caused by unavailability of the components and systems of individual units in all operating modes (during operation on power as well as during outage).

The information describing the level of nuclear safety, radiation protection, fire protection and industrial safety is evaluated periodically (weekly reports on the nuclear safety status and monthly and annual reports on the status of safety in the NPD) and discussed on the individual control levels. The unavailability of the individual components with impact on nuclear safety is monitored monthly. Results of this monitoring are submitted in the form of operational indicators into the power plants information system network.

Impact of individual component unavailability on nuclear safety is assessed using the immediate value of the Core Degradation Frequency as well as a cumulated risk value, which is a product of the Core Degradation Frequency and the duration of the component unavailability.

Deterministic nuclear safety assessment

The results of nuclear safety assessments at individual units are in compliance with the original and current legislation documented in the safety reports.

As a result of changes and modernization at the Dukovany NPP units, validity of the original Pre-operational (Final) Safety Report of the Dukovany NPP, a document supporting the issuance of the license for permanent operation, has been limited. In 1991, the state regulatory body in its resolution No. 154 established conditions to be met by the operator of Dukovany NPP in order to obtain a license to continue operation of Unit 1, i.e. after 10 years of operation. One of the conditions was to submit an updated Safety Report, at least six months before applying for a license to continue the operation, which shall present the status of nuclear safety assurance at Dukovany NPP units using the current level of science, technology and operational experience.

The safety evaluation in the mentioned updated Safety Report includes a systematic and deterministic analysis of potential failures of structures, systems and components and identifies consequences of such failures. The results have been processed to the level of detail necessary for independent assessment of the contents, depth and conclusions of the deterministic analysis. The Safety Report submitted to the SÚJB contains a description of the plant enabling independent assessment of its safety features. It also contains information on the site characteristics the design must comply with, including detailed information on main characteristics of the systems, especially those used for reactor control, shutdown, fuel cooling, retention of radioactive substances and information on service life and ageing management assessment of the safety-important components.

In the following years, the Operational Safety Reports were prepared also for the remaining units of the nuclear power plant.

The Operational Safety Report is continuously updated. After ten years, an overall revision of the Safety Report is regularly prepared. A precondition for the SÚJB decision for grant of ten-year license allowing the Dukovany NPP units to operate after 2005 is the revision of the Pre-operational (Final) Safety Report according to the request of the accepted US standard RG1.70. The Pre-operational (Final) Safety Report of the Dukovany NPP was already revised according to such requirements and the final inclusion of changes for 2004 is in progress.

In 2003 the Periodic Safety Review (the so-called PSR) process was also updated for the Dukovany NPP after 20 years of operation in accordance with new requirements of the IAEA

Safety Guide NS-G-2.10. The PSR of the Dukovany NPP will be carried out in 14 areas (Power Plant Design, Actual Status of Systems, Constructions and Components (SSC), Equipment Qualification, Ageing, Deterministic Safety Analyses, Probabilistic Safety Analyses, Risk Analyses, Operational Safety, Utilization of Operational Experience from Other Power Plants and Research Results, Organization and Administration, Procedures and Regulations, Human Factors, Emergency Planning and Environmental Radiological Impact). Specification of individual areas, respective safety factors and the assessment extent will be part of the Quality Assurance Program for the PSR process of the Dukovany NPP. This process shall, among others, help in providing documentation for preparation of the operating licenses renewal for the Dukovany NPP units after 2015. The final report on PSR of the Dukovany NPP will be submitted in 2007.

The Pre-operational (Final) Safety Report was the basic document of the licensing process during the Temelín NPP commissioning. Each change performed during the commissioning had to be carefully assessed by the operator to prove the compliance with original safety criteria of the Pre-operational (Final) Safety Report. The commissioning process itself was managed to avoid deviation from the conditions and prerequisites verified by safety analyses.

The Pre-operational (Final) Safety Report, common for both Temelín NPP units, was updated with respect to performed changes during commissioning and trial operation. The Pre-operational (Final) Safety Report was prepared in accordance with the internationally accepted US standard RG 1.70.

Modifications affecting safety and altering the employed Pre-operational (Final) Safety Report prerequisites shall be approved by the SÚJB before their implementation. This procedure was approved for both NPD power plants by the common agreement between the SÚJB and ČEZ, a. s. NPD. Responsibilities of the individual departments of the plant in assessment of the modification impacts on its own processes are specified in the relevant control documentation.

Probabilistic safety assessment of the Dukovany NPP

The first Probabilistic Safety Assessment study (PSA) level 1 of the Dukovany NPP was completed in 1993. The study considered internal initiating events and reactor operation at the nominal power. Since then the level 1 PSA has been elaborated down into more detail and extended with the low-power modes and outage. Currently the level 1 PSA study has established the resulting Core Degradation Frequency (CDF) for the Dukovany NPP:

- CDF = $1{,}27.10^{-5}$/reactoryear for operation at the power 2 ÷ 100 %
- CDF = $3{,}69.10^{-5}$/reactoryear for low-power modes and outage
- Total CDF = $4{,}96.10^{-5}$/reactoryear for all operating modes (summary of previous values)

Completion of all planned modernization activities and modifications of operating procedures will further improve these values.

Since 1995 the risk monitor has been used at Dukovany NPP to assess Core Degradation Frequency caused by unavailability of components at the individual units of the nuclear power plant. The risk monitor is regularly updated by the "Living" PSA-1 study.

Development of the level 1 PSA model of the Dukovany NPP was performed in the following years. This development was related to a more detailed evaluation of human factor. The study was also extended to include other initiating events, such as internal fires, floods and consequences of a high-energy pipeline rupture. Similarly, modifications implemented at the nuclear power plant, which included the design changes, equipment replacement and alterations in the operating procedures, have been gradually incorporated into the model.

Further to results of the level 1 PSA study of the Dukovany NPP the effort concentrated on a reduction of impact of the most significant sequences of events. Further changes in the design were made, some equipment was replaced and new emergency procedures were developed. All the planned modifications of the power plant units relating to nuclear safety were evaluated, based on the results of the level 1 PSA study of the Dukovany NPP, and prioritized. The results of the level 1 PSA study of the Dukovany NPP have been also used to support the development of a new procedure dealing with emergency conditions.

The first results of the level 2 PSA study establishing probability of a radioactivity release into the environment during serious accidents were handed over to the state regulatory body in April 1998. In 2002 the level 2 PSA study was updated and new input data were included on based on the actual level 1 PSA model.

Further the so-called Shutdown PSA (SPSA), i.e. the PSA for reactor low-power states and for outage, was completed in 1999. The SPSA results show that the total core damage contribution during outages is comparable to the contribution during operation at full power.

The so-called "Living" level 1 PSA study of the Dukovany NPP is a permanent program. The work covers the following two main areas:

- updating of the study, i.e. modeling of the implemented modifications, updating of specific data for the units and incorporation of more accurate analyses into the model, etc.,
- extending of the study scope.

Probabilistic safety assessment of the Temelín NPP

The probabilistic assessment of the Temelín NPP Unit 1 was developed in 1993 – 1996.

The purpose of the PSA project of the Temelín NPP was to assess serious accident risks, to understand the most probable emergency sequences that may occur at the plant, including their importance, to acquire quantitative understanding of the total probability of Core Degradation Frequency and frequency of release of radioactive substances and to establish the main contributors to such releases. The PSA project of the Temelín NPP included evaluation of level 1 PSA both at power operation and at low-power states and during outages, and the evaluation of risk, fires, floods, seismic events and other external events. The project also included evaluation of the level 2 PSA, including source terms establishing. As to events, only the potential risks of sabotage, war and external impact of accidents were not assessed (level 3).

Since the beginning, PSA analyses have been drawn up as "Living", including close involvement and development of the individual analyses by the NPP personnel to maintain result models in an actual status for risk-informed applications everyday use either by the PSA specialists or by the NPP operating personnel. One of the above-mentioned applications was also the possibility of risk on-line monitoring of both Temelín NPP units operation. Upon these grounds, the work scope was extended in 1996-1999 and the PSA basic models (for the all operational states and levels 1 and 2) were converted to develop a localized version of the Safety Monitor 2.0 software from the Scientech Company. The main purpose of this software and its related probabilistic models is to analyze the impact of both actual and planned configurations of the NPP, including maintenance activities and equipment tests for immediate operational risk level in all operating modes without the necessity to have any knowledge from the PSA field. Validity of the license for this software was subsequently then purchased for the Dukovany NPP.

In 2003 updating of the PSA analyses of the Temelín NPP was completed, based on current status of the power plant during its commissioning. The analyses updated in 2001-2003

represent the most recent knowledge on the plant's response to emergency situations, current design and operational condition after the implementation of many safety improvements. This enables to assess the impact of safety related measures at the Temelín NPP, using the Core Degradation Frequency (CDF) and Large Early Release Frequency (LERF) and thus acquire a more realistic estimate of the current safety level in the commissioning and further operation stages.

The main results of the updated PSA models of Temelín NPP for analyzed list of initiating events and the Temelín NPP status at the beginning of 2004 represent Core Degradation Frequency estimation of the Temelín NPP:

- CDF = $1{,}49.10^{-5}$/year for power operation at power
- CDF = $9{,}28.10^{-6}$/year (outage) for all operating conditions of the outage
- Total CDF = $3{,}32.10^{-5}$/year for all operating modes and events

At the same time, a new conversion of updated PSA models to the Safety Monitor software environment version 3.5a was performed, including localization. The software operation, including models, is currently tested in the Temelín NPP network environment and is used especially for optimization of maintenance activities during operation as well as during outages, for assessment of the overall risk profile and for support of applications for the evaluation of allowed outage time (AOT).

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

The Dukovany and Temelín nuclear power plants have implemented the following three basic programs with the objective to monitor and to maintain the level of nuclear safety:

- preventive maintenance program,
- in-service inspections program,
- program monitoring ageing of the main components.

Preventive maintenance program

Maintenance is carried out in agreement with the established maintenance program, including the preventive maintenance program, for individual equipment. The methods and scope of maintenance depend on the level of safety and reliability required for the equipment.
The basic maintenance methods applied include:

- preventive maintenance, which is further divided into periodic preventive maintenance and predictive maintenance,
- corrective (ad-hoc) maintenance.

The preventive maintenance is carried out in the prescribed cycles, i.e. regular time intervals defined by real time, number of hours in operation and based on the actual condition of the equipment as identified by audits, inspections and diagnostic measurements. The scope depends on the maintenance type, i.e. a routine repair, medium-sized repair or major overhaul. Results of the inspections, monitoring, nuclear safety and reliability assessments as well as results of the operational diagnostics are employed to evaluate and to optimize the maintenance program for a particular equipment.

The maintenance scope and funding are planned in a range of plans, from long-term (5-years) maintenance plans up to daily maintenance plans. A special information system is applied for the purpose of the actual management of maintenance.

Preventive maintenance (as well as repairs) is often contracted to qualified companies –

mostly manufacturers of the equipment (Vítkovice Ostrava, Škoda Plzeň, Sigma) - and to the companies established through transformation of the plant's own maintenance section. All those activities are carried out in accordance with the established procedures and under supervision.

In-service inspections program

In-service inspections are carried out in accordance with an inspection plan approved by the SÚJB for safety related components as selected by the plant designer. The selection has been also approved by the SÚJB. The inspection programs for individual components were proposed by the equipment manufacturers and are included into the so-called "individual" quality assurance programs for each component.

The following methods are used for the inspection purposes: visual inspection, fluorescent penetrant inspection, magnetic powder, eddy currents, ultrasound transmission, ultrasonic thickness measurement, dimension measurement, tightness and pressure tests, diagnostic measurements. The range and number of these methods depend on the particular component's importance. In accordance with the ENIQ methodology NDT methods are qualified on the safety-important components. Inspections performed by automated methods are, as a rule, contracted from external suppliers, usually manufactures of the monitored equipment or from specialized companies, which are also qualified accordingly.

Before each unit is put into operation, results of the inspections performed on the equipment being repaired or revised during outages are reviewed by a group of professionals made up of representatives from regulatory bodies (SÚJB, ČÚBP, ITI), equipment manufacturers and internal plant supervisors.

Components life monitoring program

A component life monitoring program on both NPPs focuses particularly on the main plant components important for nuclear safety.

In respect to the primary circuit equipment residual service life is monitored of the reactor pressure vessel, including its internals, of steam generator, main circulation pumps and pressurizers; the residual service life is also monitored for the main circulation pipeline. Input data into the service life monitoring program are the measured process parameters (especially temperature, pressure and dose load), as well as information obtained from non-destructive in-service inspections, chemical data to identify a particular corrosion environment, as well as material and physical properties.

For the secondary circuit a similar program focuses on the piping systems, where the erosive corrosion is the most significant damaging phenomenon.

The Ageing Management Program, or the Plant Life Management (PLIM) has been used at the Dukovany NPP as well as at Temelín NPP since the beginning of their operation. In view of the fact that Dukovany NPP exceeded already half of its life originally set by the design and further that ČEZ, a. s. declared a strategic objective for its NPPs to stretch out the life span by 10 year, the work was commenced in order to develop Long Term Operation program in accordance with world wide experience. Therefore, ČEZ, a. s. took part in the IAEA program called the Safety Aspects of Long Term Operation (SALTO).

Degradation mechanisms are identified in the life management process a mathematical description of the material damage process is created and subsequently the monitoring program for the evaluation of material damage trends and thus for the determination of the residual life is established.

In the Dukovany NPP, diagnostic software DIALIFE has been created for the machine technologies, performing the calculation of the equipment residual life using verified calculation programs based on information from the technological information systems of the production units, diagnostics, chemistry, special measurements, SCORPIO system, non-destructive testing results, and material properties database. In this way life monitoring of the following equipment is performed:

- steam generator,
- pressurizer,
- main circulation pump,
- main (coolant) circulation pipeline,
- evaluation of fatigue damage of the reactor pressure vessel.

For the monitoring in DIALIFE, the pipes of safety class 1 and 2, including the compensation pipe, are prepared.
Great attention is paid to the radiation embrittlement of the reactor pressure vessel. The program "Complementary surveillance program project" applied in Dukovany NPP removes, among others, the inaccuracies of the descending reduction and interpretation of data about neutron fluence, and enables to monitor the lifetime during the whole reactor pressure vessel life in accordance with the legislation and international standards.

Erosion/corrosion of piping systems made of carbon steel is monitored in the Dukovany NPP by the CHECKWORKS program on following systems:

- feed water to steam generator,
- live steam,
- residual heat removal,
- feeding tank emptying into condenser,
- condensate to feeding tank,
- pipe 6,7 and 8 of the turboset extraction,
- heating steam condensate from the high-pressure re-heater,
- condensate pumps discharge pipe to low-pressure re-heaters 1,2,3,4,5.

Similarly, in the Temelín NPP, diagnostic software DIALIFE is created for the machine technologies, performing the calculation of the equipment residual life using verified calculation programs based on information from the technological information systems (production units, diagnostics, chemistry, special measurements, non-destructive testing results, and material properties database). The Langer, Mason-Cofin and Woehler design life curves may be used in the program. In this way life monitoring for the low cycle fatigue of the following equipment is performed:

- steam generator
- pressurizer
- main circulation pump
- main (coolant) circulation pipeline and energy pipeline connected thereto leading to the first stop valve, including the pipeline between pressurizer and loops
- evaluation of fatigue damage of the reactor pressure vessel
- bubbler tank and its feed piping
- steam outlet pipeline from steam generator
- reactor residual heat removal exchanger
- diesel generators

The monitoring applies to approximately 2000 points (reactor 1160, pipeline 638, MCP 104).

The DIALIFE includes also mathematical description of the material damage process caused by stress corrosion.

Great attention is paid to the radiation embrittlement of the reactor pressure vessel. Full-valued surveillance program is implemented for the reactor pressure vessel materials, including cladding, in accordance with the legislation and international standards.

The inner reactor was verified using the accelerated in-pile experiments.

In addition, the online system is installed within the primary circuit diagnostic system to monitor and evaluate the MAFES temperature and pressure cycles. The evaluation is performed in 9 sections in the vicinity of potentially critical areas of weld deposits on the primary pipeline.

Erosion/corrosion of piping systems made of carbon steel is monitored in the Temelín NPP by the CHECKWORKS program on following systems:

- feed water to steam generator
- live steam in the room 820 (intermediate turbine hall)
- pipes of the turboset extraction
- regeneration condensate pipe

9.1.4 Regulatory practice

The SÚJB is obliged and granted the authority by the Atomic Act to verify and to assess nuclear safety (see chapter 9.1.1). The SÚJB discharges the said obligation through:

- the inspection activities aimed at observation of the Atomic Act and its implementing regulations,
- the so-called "licensing" procedures (to issue licenses for particular practices),
- the approvals of documentation as defined by the Atomic Act.

The verification of a nuclear safety status by SÚJB is based particularly on its inspection activities. Section 39 of the Atomic Act establishes authority for SÚJB inspectors to carry out inspection activities. Section 40 establishes authority of the inspectors to require that remedial measures are adopted within established deadlines, impose corrective measures, inspections, tests and reviews, including the right to propose fines. Moreover, in agreement with Section 40, the SÚJB is authorized, in the event of hazard arising from delay or occurrence of undesirable situation with 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.

Essentially, there are three different forms of inspection activities performed by the SÚJB:

- routine inspections,
- planned specialized inspections,
- inspections responding to a particular situation (the so-called "ad-hoc" inspections).

The routine inspections are planned to cover all regular important activities performed by the licensee, especially in respect to compliance with the Limits and Conditions for safe operation. This plan is developed based on the plans for operation, requirements of Limits and Conditions and requirements in the operating procedures; the inspections are performed on daily, weekly and quarterly basis. Results of the routine inspections are usually evaluated once a month. The evaluation activity is documented in monthly reports and discussed with the licensee. The routine inspections are mostly performed by resident inspectors located at

the individual nuclear installations and dedicated particularly for such activities.

In case of the planned specialized inspections a regular semi-annual plan is developed based on:

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

The inspections are usually carried out by a team of inspectors, made up of resident inspectors and inspectors from the Central Office.
The so-called "ad-hoc" inspections are performed to examine events and failures with impact on nuclear safety, as well as to clarify serious findings from the routine or planned inspections.

The SÚJB assesses the level of nuclear safety also in the course of the so-called "licensing" procedure to issue licenses for activities identified in the Atomic Act. Moreover, the SÚJB assesses the level of nuclear safety assurance within the following activities:

- assessment of the periodically submitted Operational Safety Report (requirements for its submittal are specified in the respective SÚJB resolution),
- evaluation of the in-service inspections program,
- evaluation of the program for the enhancement of nuclear installations safety,
- evaluation of feedback from the operational experience and implementation of the latest scientific knowledge and technology.

In agreement with the Atomic Act, all results obtained by the SÚJB in the area of nuclear safety verification and assessment are regularly submitted to the government on annual basis. The results are also made available to the general public.

9.2 Statement on the implementation of the obligations concerning Article 14 of the Convention

In agreement with the requirements of Article 14 of the Convention, the Czech licensee performs comprehensive and systematic safety evaluation before a nuclear installation construction, commissioning and throughout its whole service life. The evaluation is documented and updated on as needed basis, to reflect operational experience and significant new scientific and technological information relating to nuclear safety and, in compliance with the Act, assessed by the responsible regulatory body. The requirements of Article 14 of the Convention are thus fulfilled.

10. Radiation Protection – Article 15 of the Convention

Each Contracting Party shall take appropriate steps to ensure that in all operational conditions the radiation exposure of the workers and the public caused by a nuclear installation is kept as low as reasonably achievable and that no individual is exposed to radiation doses exceeding prescribed national exposure limits.

10.1 Description of the current situation

10.1.1 Summary of legislation relating to radiation protection

Radiation protection in Czech nuclear installations is regulated by the Atomic Act and its implementing SÚJB Decree No. 307/2002 Coll., on radiation protection.

The legislation in the radiation protection area is consistently based on internationally recognized radiation protection principles which observe recommendations of renowned international non-governmental expert organizations and especially recommendations issued by the International Commission on Radiological Protection (ICRP) No. 60 of 1990, as well as on related international fundamental standards for radiation protection approved by intergovernmental organizations, including the International Atomic Energy Agency.

The preparation of legal documents was guided also by the required harmonization of the respective law in the area of radiation protection in the Czech Republic. The modification of such legal regulations carried out in 2002, is fully harmonized with the corresponding directives of the European Union, particularly with the Council Directive 96/29/Euratom of May 13, 1996. The Atomic Act shall lay down the system of the protection of individuals and the environment against the adverse effects of ionizing radiation. General obligations associated with the utilization of nuclear energy and ionizing radiation together with the radiation practices are established in § 4 of the Act. They include particularly the following general obligations:

„Anybody who utilizes nuclear energy or performs radiation practices or interventions to reduce exposure due to radiation accidents, shall justify such activities by their benefits, which shall offset any possible existing or potential risks (the so-called justification principle)",

„Anybody who utilizes nuclear energy or performs radiation practices, prepares or performs interventions to reduce accidental exposures, shall maintain such a level of radiation protection so that risks to life and health of people and to the environment are as low as reasonably achievable, economic and social factors being taken into account " (the so-called optimization principle, ALARA principle)",

„Anybody who performs selected radiation practices, including utilization of nuclear energy shall make sure that the total sum of exposure caused by a potential combination of exposures from radiation practices does not exceed the exposure limits established by SÚJB determined. (the so-called dose limitation principle)",

„The exposure of any individual involved in actions responding to a radiation accident shall not exceed the tenfold of the limit established for the exposed workers, unless human lives are at risk or prevention of further development of the radiation accident with potential extensive social and economic consequences",

„Intervention measures to avert or reduce accidental exposure shell be adopted whenever

the expected exposure approaches to the levels where their health is immediately impaired by the exposure or whenever such measures are expected to bring more benefits than drawbacks".

The Atomic Act establishes the obligation to obtain a license from SÚJB for practices listed in § 9 (siting, construction, individual stages of commissioning, etc.). For more details see chapter 3.1.2. The same applies for the release of radionuclides into the environment and for radioactive waste management. A number of additional obligations for the licensee are established in § 17 – 19 of the Atomic Act. In respect to the radiation protection at nuclear installations the obligations include in particular:

- to assure radiation protection in the scope required by the particular licenses and to assure systematic supervisions of compliance with radiation protection requirements,
- to comply with the conditions specified in the license issued by SÚJB, to proceed in accordance with approved documentation and to promptly investigate any violation of such conditions or procedures, and to adopt corrective measures to prevent that the situation occurs again, including the obligation to promptly report all cases where any exposure limit has been exceeded to the State Office for Nuclear Safety,
- to comply with the technical and organizational conditions for the safe operation of nuclear installations as laid down in the implementing regulations,
- to participate in the functioning of the National Radiation Monitoring Network to the extent established in a government order,
- to promptly report to the State Office for Nuclear Safety any change or event affecting nuclear safety, as well as any change in circumstances decisive for issuance of the license,
- to provide the general public with information on nuclear safety and radiation protection assurance,
- to monitor, measure, evaluate, verify and record all values, parameters and facts important from the radiation protection point of view, in the scope established in the implementing regulations, including radiation monitoring of individuals, the workplace and its vicinity, to keep and file records on the mentioned facts and to submit the recorded information to the State Office for Nuclear Safety in a manner specified in an implementing regulation,
- to minimize the produced quantity of radioactive wastes and spent nuclear fuel to the necessary level,
- to prepare and hand over to Radioactive Waste Repository Authority (SÚRAO) 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 payments to the nuclear account,
- to keep records about radioactive wastes by type of waste, in such a manner that all characteristics affecting its safe management are apparent,
- to provide for regular medical checkups of personnel who handle ionizing radiation sources,
- to provide a system of training, verification of competence and special professional competence of the personnel in accordance with the importance of the work they perform.

The Atomic Act also establishes the rights and obligations with respect to radioactive waste management. Depending on a level of contamination the Act basically distinguishes between three categories of radioactive wastes. The first category includes wastes which satisfy the generic clearance levels stipulated by the SÚJB Decree no. 307/2002 Coll. (§ 57), and which may be discharged into the environment without the permit issued by the State Office for Nuclear Safety. The second category includes wastes exceeding these clearance levels, and

which may be discharged into the environment following a relevant administrative procedure, based on a permit issued by the State Office for Nuclear Safety, and in a manner and under conditions specified therein. The third category includes wastes highly contaminated with radionuclides, requiring a long-term isolation from the environment and disposal in a radioactive waste repository. The disposal of radioactive wastes is entrusted by law to the Radioactive Waste Repositories Agency (SÚRAO).

The basic regulation for the implementation of the Atomic Act in the radiation protection area is the SÚJB Decree No. 307/2002 Coll., on the radiation protection. The decree specifies details of the manner and extent of the assurance of the protection of individuals and environment against adverse effects of ionizing radiation during radiation practices as well as during the preparation for and actual performance of actions to reduce the existing exposure; the regulation is thereby used for the implementation of the majority of authorizations established in the Atomic Act in respect to the radiation protection.

Among other things, the SÚJB Decree No. 307/2002 Coll. quantifies, which materials and objects are considered radionuclide sources, i.e. which things and objects are subject to regulation and, on the other hand, which may be excluded from the regulation. The decree establishes the criteria for ionizing radiation sources classification as insignificant, minor, simple, significant and very significant sources (§ 4 – 10), the criteria for categorization of workplaces, where the radiation activities are performed, into workplaces of categories I. to IV. (§ 11 – 15), and the criteria for categorization of radiation employees into categories A and B (§ 16). The decree also defines the procedures and criteria related to the radiation protection optimization (§ 17), and introduces values of dose limits (§ 18 – 23).

The SÚJB Decree No. 307/2002 Coll. also governs the details of methods and the scope of radiation protection provision in the course of radiation practices and in the course of actions to reduce exposure from radiation accidents, and it particularly:

- establishes the scope and manner of handling the ionizing sources requiring license, and the requirements for radiation protection provision for the individual types of their handling,
- governs the details of radioactive waste management and the release of radionuclides into the environment,
- establishes technical and organizational conditions of safe operation of ionizing radiation sources and workplaces using such sources, including details about the controlled area definition and the categorization of workplaces with sources of ionizing radiation,
- defines values, parameters and facts necessary from the radiation protection point of view, establishes the scope of their monitoring, measuring, evaluation, verification, recording, registration and method of data transmission to the State Office for Nuclear Safety,
- establishes the guideline levels and details on rules for the adoption of measures to prevent or reduce exposure during a radiation accident.

10.1.2 Implementation of radiation protection requirements

Dose limits

New regulations issued in 2002 made the dose limits values to conform to the Council Directive 96/29/Euratom.

The most frequently used whole body dose limits are now expressed as internationally recommended values, which express the effect of exposure on the whole human organism (the effective dose). The values represent a sum of effective doses from the external exposure and relevant committed effective doses from internal exposure in a specified period. New

regulations, unlike the previous ones, establish neither limits for periods shorter than one calendar year nor limits related to periods longer than five consecutive calendar years.

The limits for individual members of a population, i.e. persons usually exposed involuntarily and unconsciously, are lower than the limits for persons who are aware of the possible risks and are exposed voluntarily and intentionally, either while executing their professional duties or while being trained for such a profession.

The effective dose limits for occupational exposure of personnel of categories A and B, i.e. persons exposed to radiation in connection with the performance of radiation practices, are 100 mSv for the period of five consecutive calendar years, providing that in one calendar year the value shall not exceed 50 mSv. In addition, a routine regular monitoring is required of personal doses received by personnel in category A, which also includes all persons working in controlled areas of nuclear installations, while the resulting records shall be kept on file until the individual has or would have attained the age of 75 years, but in any case not less than 30 years from the termination of the work involving exposure to ionizing radiation. To monitor the personnel in categories A and B the SÚJB Decree No. 307/2002 Coll. also establishes derived limits that are easier to monitor and expressed in more immediately measurable units.

The effective dose limit for the individuals between 16 and 18 years of age, who are exposed to radiation consciously and voluntarily in the course of special training for their future profession, and who have been in a demonstrable way instructed about their potential occupational exposure and about the related risks, is 6 mSv in a single calendar year.

The general effective doses limits, i.e. limits related to all other individuals from the population, are 1 mSv for one calendar year or, under conditions laid down in the permit to operate the workplaces of category III. or IV., exceptionally the value of 5 mSv for the period of five consecutive calendar years.

The general limits are related to the average calculated exposure of the most exposed population group, for all expected exposure ways from ionizing radiation sources and all radiation practices, which are to be considered. If no direct data is available for such calculations, the conservative estimates of factors affecting the spreading of radionuclides or the exposure of individuals of the most exposed population group, must be used. To monitor, in an easier way, the adherence to exposure limits of individuals in the vicinity of a certain installation, the State Office for Nuclear Safety has the right to establish the dose constraints related to the exposure caused exclusively by this installation and serving as the upper bound to optimize the radiation protection of the nearby population.

Conditions for discharges of radioactive substances

The discharging of liquid and gaseous radioactive substances from nuclear installations into the environment is, in accordance with the Atomic Act (§ 9) subject to the permit issued by SÚJB, and more details, including the criteria necessary for the corresponding permit, are established in § 56 of the SÚJB Decree No. 307/2002 Coll. In addition, the latter establishes that the optimizing limit for the discharges from nuclear energy installations is 250 microsievert (μSv) for the average annual effective dose of the most critical group of population, from what 200 microsievert for discharges into the atmosphere or 50 microsievert for discharges into the watercourse. Each discharge shall be justified and optimized. Therefore the authorized limits of discharges into the atmosphere as well as into the watercourse are of lower order for individual nuclear power plants.

A permit to discharge radionuclides into the environment is issued by the SÚJB. However, for

discharges into the watercourse a broader authorization is issued by the relevant local water management authority, in agreement with the SÚJB with respect to problems related to the radioactivity of waters.

The derived activity limits for discharges for nuclear power plants are defined by the procedure authorized by the SÚJB and are listed in the corresponding monitoring programs, which are continually updated and subject to the SÚJB approval.

All real discharges are monitored by an extensive monitoring system operated both by the nuclear installation operators and by the independent measurements carried out directly by the SÚJB or through the State Institute for Radiation Protection. The measurement results provide reliable evidence that the permitted discharges limits are not exceeded and that the average effective dose of population due to discharges in the vicinity of the nuclear installations is not higher than tens of microsieverts per year.

Optimization in radiation protection

The technical and organizational requirements, limits and procedures used for the justification of a reasonably achievable level of radiation protection are established in § 17 of the SÚJB Decree No. 307/2002 Coll. The requirements are assessed within the licensing process and in the course of regular inspections. For nuclear installations this means that:

- the corresponding protective measures as well as collective doses and doses in the relevant critical groups have to be assessed and compared before the commencement of each activity resulting in exposure,
- regular (annual) analysis of doses received during the activity resulting in exposure must be carried out, while considering additional measures available to assure the radiation protection and comparison with similar operated and socially acceptable activities.

The reasonably achievable level of radiation protection can be demonstrated by a procedure, which compares the costs of alternative measures for the enhancement of radiation protection (e.g. introduction of additional barriers) with the financial benefits expected from the correspondingly reduced exposure. The reasonably achievable level of radiation protection shall be considered proven and no additional measures are required if the costs are higher than the benefits.

The SÚJB Decree No. 307/2002 Coll. establishes the amounts of monetary equivalents for the reduction of collective effective doses of exposed personnel or population, scaled based on the expected average effective dose and exposure limits. The decree also takes into account the possible need for the adjustment of the financial amounts. The optimizing limit for the operation of nuclear power installations is the collective effective dose of 4 Sv per one calendar year for each installed GW of the output related to the exposure of all radiation employees, for whom the personal monitoring is performed in accordance with the monitoring program.

Radiation monitoring in the vicinity of nuclear installations

An operator of a nuclear installation is legally responsible for the radiation monitoring in the installation vicinity. The monitoring shall be carried out in accordance with the monitoring program approved by the SÚJB. The monitoring program establishes the scope, frequency as well as the methods of measurement and evaluation of results and the corresponding reference levels. The monitoring at nuclear installations is currently performed, as a rule, directly by specialized departments of the operator. The SÚJB inspects the fulfillment of the monitoring program and also performs its own independent measurements.

The dose rates in the vicinity of Dukovany NPP and Temelín NPP are continuously monitored by a teledosimetric system operated by the nuclear power plant. There is at least one point of the national independent early warning network close to each plant (see later). Monitoring of the equivalent dose rates due to external exposure in the vicinity of the nuclear power plants is performed by local networks of thermoluminiscent detectors operated by the radiation monitoring laboratory of the respective plant. Independently of these networks, the SÚJB Regional Centers perform their own measurements using the thermoluminiscent detectors. Until now, none of these networks has recorded any violation of the investigation levels caused by the operation of the nuclear power plant.

Regular sampling and measurements of radionuclides activity in components of the environment in the vicinity of Dukovany NPP is carried out by the radiation monitoring laboratory and the SÚJB Regional Center in Brno. In the vicinity of Temelín NPP the measurements are performed by the radiation monitoring laboratory and the SÚJB Regional Center in České Budějovice.

Since the nuclear installations are part of the National Radiation Monitoring Network, the regulatory bodies receive regular overviews of the measurement results. Moreover, the operator of the nuclear power plants on its own initiative publishes various information materials for the public. This area is governed by the Government Order No. 11/1999 Coll. on the emergency planning zone (see chapter 2.1.2).

A number of other measurements are performed 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 make decisions on the measures to protect the population. The measurements are performed within the National Radiation Monitoring Network coordinated by the SÚJB. Results of the monitoring are submitted to the Committee for Civil Defense and Emergency Planning and to the public in annual reports on the radiation situation on the Czech Republic's territory, through the relevant District Authorities, sanitary stations and libraries.

The function and organization of the Radiation Monitoring Network are governed by the SÚJB Decree No. 319/2002 Coll. The Radiation Monitoring Network operates in two modes: the "regular" mode focuses on monitoring of the current radiation situation and on early detection of a radiation accident, while the so-called "emergency" mode focuses on the assessment of consequences of such an accident. The regular mode is carried out continuously by so called "permanent elements" of the Radiation Monitoring Network. The emergency mode uses also its "emergency elements". The monitoring in normal conditions is carried out by several subsystems using either some selected or all permanent elements of the Radiation Monitoring Network. The subsystems can be divided into the following seven groups:

- early detection network, composed of 54 continually working measuring points with the automatic data transmission of the measured values to the central database,
- territorial TLD network of 184 measuring points equipped with thermoluminiscent dosimeters,
- local TLD networks with 92 measuring points equipped with thermoluminiscent detectors in the vicinity of Dukovany NPP and Temelín NPP,
- territorial network for air contamination measurements which includes 11 air-contamination measuring points, equipped with a large-scale sampling equipment for aerosols and fallouts,

- network of 9 laboratories performing the gamma-spectroscopic and radiochemical analyses of the radionuclides content in the environment samples (aerosols, fallouts, food, drinking water, feedstuff, etc.),
- mobile groups and aircraft group equipped with the instrumentation measuring the dose rates in the atmosphere (volume activity) and on the ground (deposition of radionuclides).

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

10.1.3 Supervisory activities

The Atomic Act entrusted the execution of the state supervision of the radiation protection in the Czech Republic to SÚJB (see chapter 3.1.2).
The inspection activities in radiation protection are performed by the SÚJB radiation protection inspectors. At present, there are in total 75 inspectors, located at the Central Office in Prague and at eight Regional Centers all over the country. The inspectors are required to prove their professional competence in the field, to have a university degree in the respective field and at least three years of professional experience. The inspectors are appointed by the SÚJB Chairperson. For more details see chapter 3.

The inspections are carried out by the inspectors of the SÚJB Regional Centers within the territory of the relevant region, or by the Specialized Inspection Groups focused on specific types of ionizing radiation sources and their workplaces, where it is required to achieve a higher level of the unification of radiation protection practices all over the state (e.g. nuclear medicine workplaces, workplaces with open radionuclide sources of category II. and higher, nuclear energy, radio-therapeutic workplaces, etc.). This inspection system is complemented by inspections carried out ad hoc for special inspections, especially at the workplaces of categories III. and IV.

The inspections are carried out in accordance with standards governed by the SÚJB internal documentation, which includes the establishment of principles for the preparation of inspections, their performance, evaluation and recording of results to the central database.

10.2 Statement on the implementation of the obligations concerning Article 15 of the Convention

The requirements of Article 15 of the Convention are fulfilled in the Czech Republic, both in respect to legislation and implementation.

11. Emergency preparedness - Article 16 of the Convention

(*i) 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.*

(ii) 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.

(iii) 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 in neighboring country, 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 Summary of national legislation for on-site and off-site emergency preparedness

The legislative framework for the emergency preparedness of nuclear installations and their vicinities is in particular given by the Atomic Act, its implementing decrees and related government ordinances (see chapter 2.1.2).

The provision of § 2 of the Atomic Act defines the basic terms – emergency preparedness, radiation incident, radiation accident, radiological emergency, emergency exposure, emergency planning zone, on-site emergency plan (plan developed for the premises of nuclear installation or workplace where the radiation activities are performed) and off-site emergency plan (plan developed for the emergency planning zone).

In accordance with § 3 of the Atomic Act, within its competence, the SÚJB:

- approves on-site emergency plans and their modifications after discussion on the relations to off-site emergency plans; the approval of on-site emergency plan is one of the conditions for obtaining a permit for the commissioning of the installation and its operation,
- establishes an emergency planning zone, based on the licensee request,
- controls the activity of the National Radiation Monitoring Network and performs the activities of its head office,
- ensures the activities of the Emergency Response Center and international information exchange on the radiation situation,
- ensures, by means of the National Radiation Monitoring Network and based on assessment of the radiation situation, the background information necessary to take decisions aimed at reducing or averting exposure in the case 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 business secret, and to publish once a year a report on its activities and to submit the report to the Government of the Czech Republic and to the public.

Among other things, § 4 of the Atomic Act establishes the principles for performance of radiation activities and limiting emergency exposure. The principles for averting or reducing exposure due to radiation accidents and exposure of people who participate in the mitigating interventions are elaborated in the implementing SÚJB Decree No. 307/2002 Coll., on radiation protection.

Within the general obligations, the provision of § 17 of the Atomic Act establishes the obligation of a licensee to ensure emergency preparedness, including its verification, in the scope appropriate for the particular licenses, and to report to the SÚJB any change important from the emergency preparedness point of view, including changes in any facts relevant for license issuing.

The provision of § 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 important for emergency preparedness, to the extent laid down by implementing regulations,
- keep and archive records of ionizing radiation sources, facilities, materials, activities, quantities, parameters and other facts important from the emergency preparedness point of view, and to submit the recorded data to the SÚJB in the manner laid down in an implementing regulation,
- ensure systematic supervision of observance of emergency preparedness, including its verification.

The provision of § 19 of the Atomic Act establishes as one of the obligations of the license in the event of radiation incident, to the extent and in the manner determined by the on-site emergency plan approved by the SÚJB, to:

- notify immediately the relevant District Authorities, the SÚJB and other relevant bodies specified in the on-site emergency plan, of the occurrence or suspected occurrence of a radiation accident,
- ensure immediately warning the public within the emergency planning zone in case of a radiation accident,
- ensure immediately that the consequences of the radiation incident are dealt with in the premises, where his activities are performed and to take measures to protect employees and other persons from the effects of ionizing radiation,
- ensure the monitoring of exposures of employees and other persons, and prevent any release of radionuclides and ionizing radiation into the environment,
- inform relevant bodies, in particular on monitoring results, on factual and expected development of the situation, on interventions taken to protect employees and the public, and on measures taken to deal with the radiation accident and also on the factual and expected exposure of people,
- control and regulate exposure of employees and other persons participating in the radiation incident mitigation within the premises where the licensee performs his activities,
- cooperate in dealing with the consequences of the radiation incident which occurred on his premises,
- participate, in case of radiation accident, in the activities of the National Radiation Monitoring Network.

In addition, the same Article also establishes the obligation of the licensee to submit to the appropriate District Authority and to the relevant Municipal Offices with extended competence background documents to prepare the off-site emergency plan and to co-operate

with the authority in order to ensure emergency preparedness within the emergency planning zone.

The Article also establishes that a governmental order will lay down a financial share of the licensee 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, in running a press and information campaign aimed at ensuring that the public is prepared for radiation accidents, in providing a system for the notification of the relevant bodies to the extent and in the manner established in the on-site emergency plan, in providing a warning system to inform the public living in the vicinity of the nuclear installation, as well as the obligation to participate in the removal of the consequences of the radiation accident within the emergency planning zone.

Based on the provision of § 46 some ministries are obliged to participate in providing for the emergency preparedness, i.e. this Article establishes that: for requirements of the Radiation Monitoring Network on the Czech Republic's territory:

a) the Ministry of Finance ensures operation of specified parts of monitoring points at border crossings and participates in operation of mobile monitoring groups;
b) the Ministry of Defence participates in operation of Early Warning Network, monitoring points at roadblocks and border crossings, operation of mobile monitoring groups and aircraft monitoring groups and ensures means of aerial survey;
c) the Ministry of Interior participates in operation of mobile groups;
d) the Ministry of Agricultural participates in operation of water contamination monitoring points and foodstuffs contamination monitoring points;
e) the Ministry of Environment ensures meteorological support and participates in operation of the Early Warning Network, air contamination monitoring points and water contamination monitoring points;
f) the Ministry of Health creates a system of special medical care provided by selected clinics to persons irradiated during radiation accidents.

Details and requirements for emergency preparedness in the case of extraordinary events (radiation incidents and accidents) are established in the implementing regulations related to the Atomic Act:

- ***SÚJB Decree No. 318/2002 Coll.,*** on details in emergency preparedness of nuclear installations and workplaces with ionizing radiation sources, and on requirements on the content of on-site emergency plans and emergency rules, as amended by the SÚJB Decree No. 2/2004 Coll.,
- ***SÚJB Decree No. 307/2002 Coll.,*** on radiation protection,
- ***SÚJB Decree No. 319/2002 Coll.,*** on function and organization of the National Radiation Monitoring Network.

The SÚJB Decree No. 318/2002 Coll., establishes details of assuring emergency preparedness of nuclear installations, such as:

- identification of extraordinary event occurrence,
- assessment of the extraordinary events significance and their classification in three basic degrees,
- announcing an extraordinary event,
- activation of intervening persons,
- management and implementation of the intervention,
- requirements for the intervention procedures and instructions,
- requirements for the radiation situation monitoring program,

- methods to limit exposure of the employees and other persons,
- medical provision principles,
- ensuring documenting of the activities during an extraordinary event,
- submitting information on the occurrence and development of an extraordinary event to the SÚJB,
- requirements for training of employees and other persons,
- requirements for the emergency preparedness verification, including emergency exercises and tests of function of technical means, systems and devices necessary for management and implementation of the interventions,
- requirements for the contents of an on-site emergency plan,
- requirements for other documentation related to emergency preparedness.

The SÚJB Decree No. 307/2002 Coll., in the provision of § 92, stipulates general regulations for the preparation and performance of the interventions, and in the provision § 98 through 100 and in the Annex No. 8 establishes details in the manner and scope of radiation protection assurance during interventions to reduce exposure due to radiation accidents. Furthermore, the Decree establishes guidance levels for the early and recovery countermeasures.

Government Order No. 11/1999 Coll., defines for the licensee the following requirements:

- for the elaboration of a proposal for establishing an emergency planning zone for the nuclear facilities or workplaces with a significant source of ionizing radiation (in accordance with § 17 of the Atomic Act the licensee shall submit this proposal to SÚJB for the determination of the emergency planning zone size),
- for ensuring the activity of National Radiation Monitoring Network in the emergency planning zone,
- for the provision of the population in the emergency planning zone with antidotes,
- for ensuring the press and information campaign for the population in the emergency planning zone for the cases of radiation accident,
- for the notification system of involved bodies about occurrence or suspected occurrence of a radiation accident,
- for ensuring the warning system of population in the emergency planning zone.

Further requirements are laid down by the Act No. 239/2000 Coll., on the integrated rescue system, as amended and by the Act No. 240/2000 Coll., on crisis management, as amended by the Act No. 320/2002 Coll.

Act No. 239/2000 Coll., as amended, establishes:

- basic and other components of the integrated rescue system, their competencies and powers of state bodies and bodies of districts, municipalities with an extended competency and municipalities, rights and duties of legal and physical entities during the preparation for emergency events and during rescue and remedy work, and the population protection during crisis situations including radiation accidents,
- basic requirements for central state administration bodies, districts, municipalities with an extended competency and municipalities when processing off-site emergency plans for the performance of rescue and remedy work for the emergency planning zones, which are part of territorial crisis plans, and which are elaborated in accordance with the Act No. 240/2000 Coll.,
- tasks of the crisis bodies and representatives of districts, municipalities with an extended competency, municipalities, legal and physical entities during the management of a crisis situation on the territory affected by the emergency event,

- conditions of the rescue and remedy work organization in the intervention point.

Act No. 240/2000 Coll., as amended, establishes the competence and power of state bodies and bodies of the self-governing administrative territories, and rights and duties of legal and physical entities during the preparation for crisis situations and during their resolution. The Act establishes bodies of crisis management and solves the issues and tasks of the safety councils to ensure the crisis preparedness for the cases of emergency events occurrence and of the Emergency Headquarters for the cases of their occurrence. The Act establishes requirements for the elaboration of crisis plans of the central state administration bodies, territorial state and self-governing administration bodies, and in case of crisis situation declaration. The Act further establishes rights and duties of legal and physical entities during the preparation for crisis situations and during their resolution.

Implementing legal regulations were subsequently issued to the above-mentioned acts, which are, among others, related to emergency preparedness assurance and crisis management in the field of utilization of nuclear energy and ionizing radiation. The relevant details are amended by:

- ***Ministry of Interior Decree No. 328/2001 Coll.***, on some details in ensuring of the integrated rescue system, as amended by the Decree No. 429/2003 Coll.,
- ***Ministry of Interior Decree No. 380/2002 Coll***., for the preparation and performance of tasks for population protection,
- ***Government Order No. 462/2000 Coll.,*** for the implementation of § 27 paragraph 8 and § 28 paragraph 4 of the Act No. 240/2000 Coll., as amended by the Government Order No. 36/2003 Coll.

Ministry of Interior Decree No. 328/2001 Coll., as amended, establishes details for the ensuring integrated rescue system, including principles for coordination and collaboration of its components during common intervention. The Decree further establishes requirements for the contents of documentation of the integrated rescue system, way of elaboration of documentation and details on alarm degrees of the alarm plan. The Decree also establishes principles and way of elaboration, approval and use of district emergency plan and off-site emergency plan, as well as the principles of crisis communication and connection within the integrated rescue system.

The off-site emergency plan, which is the emergency plan developed for the emergency planning zone, is broke-down in:

- information section,
- operations section,
- plans of specific activities.

Information section includes:

a) general description of the nuclear installation or workplace of the category IV,
b) characteristics of the territory, in particular data on demography, geography, climatic conditions and description of infrastructure on the territory,
c) list of municipalities, including the overview on the number of population, and list of legal and undertaking physical entities included in the off-site emergency plan,
d) analyses results of possible radiation accidents, and possible radiological effects on the population, animals and environment,
e) classification system of radiation accidents in accordance with the on-site emergency plan,
f) requirements for the population and environment protection in relation to intervention levels during the radiation accident,

g) description of the emergency preparedness organizational structure in the emergency planning zone, including a listing of competencies of its components for the performance of necessary activities, and
h) description of a notification and warning system, which includes the relations to licensee and information transfer within the emergency preparedness organization in the emergency planning zone.

Operations section includes:

a) tasks of administration offices, municipalities and components having relations to countermeasures included in the off-site emergency plan,
b) way of radiation accident resolution coordination,
c) criteria for the declaration of corresponding crisis situations, in case the off-site emergency plan does not suffice for the radiation accident resolution,
d) way of securing information flows during the radiation accident consequences remediation management and
e) principles for activities during the spreading or the possibility of spreading of radiation accident consequences outside the emergency planning zone and cooperation between administration offices and municipalities having relations to countermeasures included in the off-site emergency plan.

Plans of specific activities establish procedures for the implementation of the individual measures for the following areas:

a) notification,
b) warning of population,
c) rescue and remedy work,
d) sheltering of the population,
e) iodine prophylaxis,
f) evacuation of persons,
g) individual protection of persons,
h) decontamination,
i) monitoring,
j) regulation of persons movement and transport,
k) traumatological plan,
l) emergency plan for veterinary measures,
m) regulation of food, feedstuff and water distribution and consumption,
n) measures in case of death of persons in the contaminated area,
o) public order and safety ensuring,
p) communication with the public and mass information media.

The SÚJB Decree No. 380/2002 Coll., establishes, among others, details in the manner of informing legal and physical entities on the nature of the possible threat, upcoming measures and the way of their implementation, details in technical, operational and organizational ensuring of an unified warning and notification system as well as a way of providing emergency information.

The Government Order No. 462/2000 Coll., as amended, establishes in particular requirements for the handling of crisis management documents, which could be misused as handling of special facts. The Decree further establishes activities and the structure of a safety council and an Emergency Headquarters of the district and specified municipality, belongings and way of the elaboration of the crisis plan of the central state administration bodies as well as the self-governing administration bodies (districts, municipalities with extended

competence and municipalities), and plans of the emergency preparedness of legal entities or undertaking physical entities for ensuring the availability, preparedness to the fulfillment of crisis measures and protection against crisis situations effects.

11.1.2 Implementation of emergency preparedness measures, including role of the State Supervision Body and other departments

Emergency response organization (OHO)

In accordance with the SÚJB Decree No. 318/2002 Coll. the operator of the nuclear power plant (licensee) is obliged, in order to assure emergency preparedness, to create corresponding organizational and personal conditions so that in case of extraordinary events occurrence the personnel of the nuclear power plant are ready to respond immediately to the occurred situation and to commence preplanned activities aimed at eliminating the negative effects and consequences.

The Emergency Response Organization has been established both at the Dukovany locality and at the Temelín locality, which consists, during the early stage of extraordinary event development when it is required to provide for the activities related to the initial assessment of significance, notification of the extraordinary event, mobilization of intervening persons as well as operational management and implementation of intervention, of the continuous shift operation personnel only.

Shift engineer

In case of extraordinary event occurrence the shift engineer is responsible for the management of the extraordinary event until the shift engineer relegates the responsibility to the Shift Emergency Headquarters mobilized. The Shift engineer activities during the extraordinary event occurrence adhere to the intervention instruction, which includes all responsibilities and powers, which of the most important are: assessment of extraordinary event significance - classification, provision of a notification and warning of the NPP personnel and warning within the emergency planning zone, notification of nuclear power plant top management and relevant bodies and organizations on extraordinary event occurrence, decision on the Shift Emergency Headquarters activation, decision on protective countermeasures for NPP personnel.

Operational MCR personnel

The MCR personnel having the basic workplace at the relevant MCR assure the control of each unit in case of extraordinary event occurrence. In case the MCR is uninhabitable, or loss of the possibility of control of unit technology, the MCR personnel performs their activities from the ECR.

Safety engineer

In case of extraordinary event occurrence at Dukovany NPP the safety engineer passes to the MCR of the relevant unit and becomes the chief of liquidation of the extraordinary event on the affected unit. The safety engineer becomes also the contact person between the commander of the Technical Support Center and the MCR of the affected unit. Once the severe accident occurs the safety engineer shall manage the manipulation on the affected unit according to the instructions of the commander of the Technical Support Center.
At Temelín NPP, the safety engineer is part of the Technical Support Center.

Operator of the Electrical Output Control Room

The operator of the Electrical Output Control Room represents the technical and administrative support for the shift engineer. The operator particularly participates in providing the following activities: performance of notifying and warning the NPP personnel,

performance of mobilization the personnel working in the emergency support centers, performance of warning the NPP personnel and of warning the population within the emergency planning zone, cooperating in the notification of bodies and organizations in accordance with the on-site emergency plan on extraordinary event occurrence.

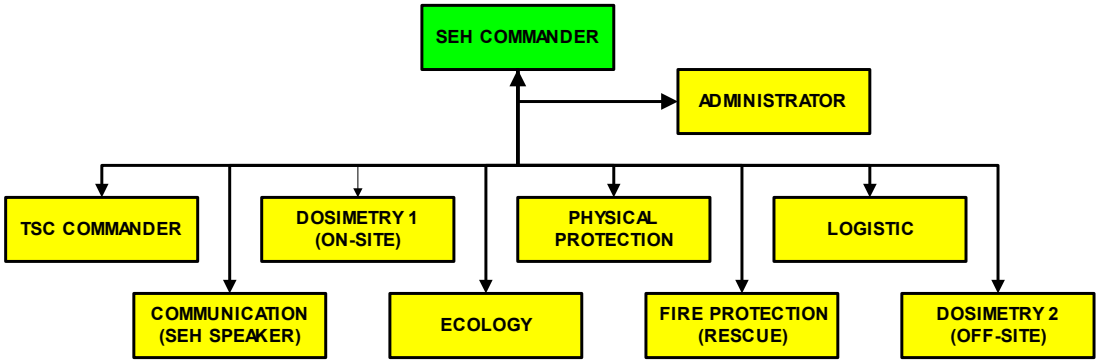
Other shift personnel

Other continuous shift operation personnel in case of an extraordinary event, depending on the significance degree, either proceeds with the activities in accordance with the instructions of the operational MCRs personnel to the extent of descriptions of its job positions, or gathers, in case of the declaration of protective countermeasures, in the operational support center, from where, based on the instructions of the shift engineer or the Shift Emergency Headquarters, the required interventions in technology are carried out or the operative support is created to the unit of the NPP Fire Rescue Brigade during clearing and rescue works.

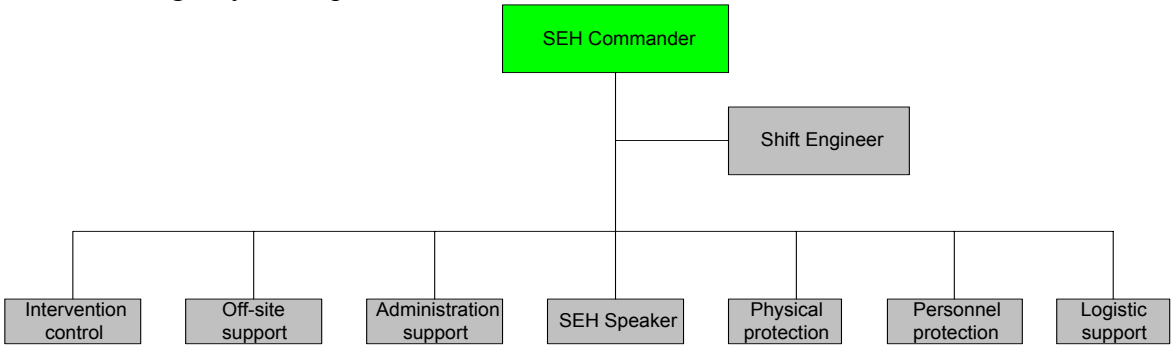
Shift Emergency Headquarters (SEH)

The Shift Emergency Headquarters (SEH) is established for the reason of prompt availability for action during management of the emergency response organization in case of the occurrence, duration and removal of extraordinary event consequences. Main tasks of the SEH, as a management body, is to manage all activities in the NPP, to transfer information to superior and supervision bodies, to inform the public and to declare the protective countermeasures for NPP employees and other persons present on the NPP premises at the time of the extraordinary event occurrence. The SEH controls the activities of the operationally established intervention groups during the liquidation of extraordinary event effects and consequences. The SEH secures the deliveries of necessary material, special means, and alternating the personnel as well as its maintenance and supplies.

Shift Emergency Headquarters structure at Dukovany NPP:



Shift Emergency Headquarters structure at Temelín NPP:

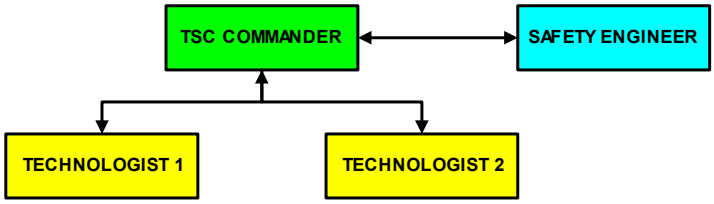


Technical Support Center (TSC)

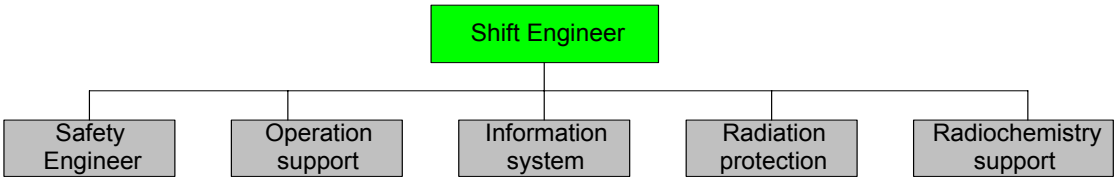
The Technical Support Center provides qualified support to the MCR personnel of the

affected unit in the course of emergency events and during liquidation of their consequences. The Technical Support Center processed background information and recommendations for decision-making and control activities of the Shift Emergency Headquarters.

Technical Support Center structure at Dukovany NPP



Technical Support Center structure at Temelín NPP



In the emergency preparedness system the emergency support centers represent specially prepared and equipped workplaces designed to secure the support of activities of personnel involved in the emergency response organization. Employees involved in the emergency response organization are obliged to participate in special theoretical and practical preparation aimed at acquiring activities determined by the on-site emergency plans and relevant intervention instructions.

Classification degrees of emergency event

To assess significance of extraordinary events, which may occur during the performance of radiation activities on a nuclear installation, these events are classified in three basic degrees (SÚJB Decree No. 318/2002 Coll., § 5):

- emergency event of the first degree is an event which results or may result in an inadmissible exposure of employees and other persons or inadmissible release of radioactive substances into the premises of a nuclear installation or workplace. A first degree event may be a radiation incident, it has a limited and local character and may be sufficiently addressed with human and material resources available to the operating personnel or shift personnel, and no release of radioactive substances into the environment occurs during transport,
- emergency event of the second degree is an event, which results or may result in inadmissible serious exposure of the employees and other persons or in inadmissible release of radioactive substances into the environment, which do not require introduction of urgent countermeasures to protect population and the environment. A second degree event may be a radiation incident requiring mobilization of licensee's intervening persons and which may be sufficiently addressed with human and material resources available to the licensee or human and material resources contracted by the licensees,
- emergency event of the third degree is an event, which results or may result in an inadmissible serious release of radioactive substances into the environment, requiring introduction of urgent countermeasures to protect population and the environment, as

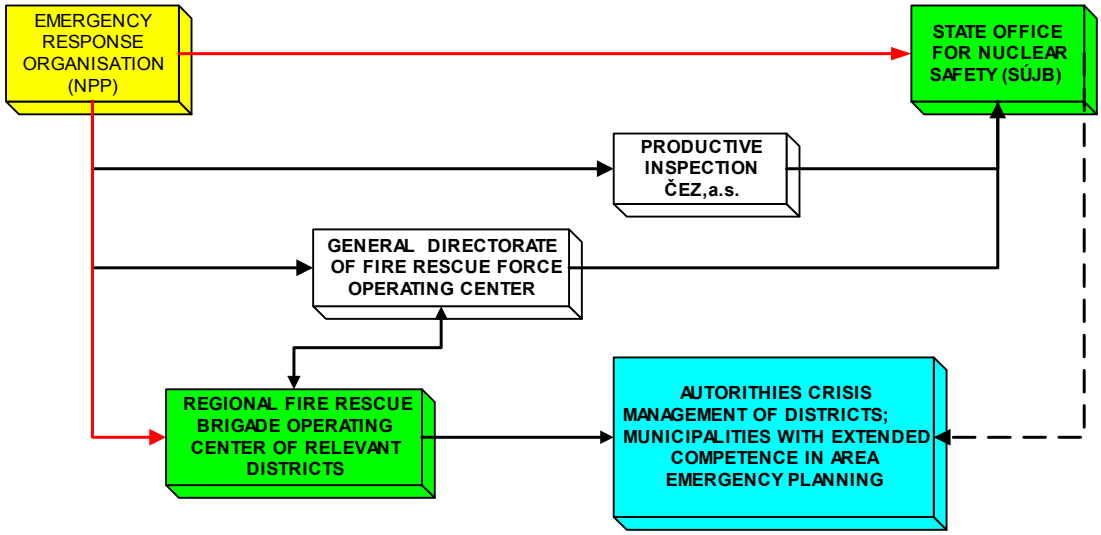
specified in the off-site emergency plan and district emergency plan[1)]. A third degree event is a radiation accident and in addition to mobilization of licensee's intervening persons and intervening persons under the off-site or district emergency plans, involvement of other relevant bodies is required to address it.

Relations of the Emergency Response Organization to external emergency bodies

Basic requirements for the cooperation with the state administration bodies during assurance of off-site emergency preparedness result from the provision of the Atomic Act and the SÚJB Decree No. 318/2002 Coll. During extraordinary event occurrence and following solution of the extraordinary event the NPP shall communicate with the following external bodies and organizations:

- SÚJB
- Relevant District Authority
- Municipalities with extended competence
- Fire Rescue Brigade

Schematic representation of the notification system in case of a radiation accident occurrence



National crisis preparedness and response systems

In accordance with the legal regulations, in particular in the area of emergency management, a structure of the crisis preparedness system was established in the Czech Republic for the case of crisis situations of different types. Fig. 11-1 shows the basic diagram of the structure of the crisis preparedness system for the case of a radiation accident.

In case of a radiation accident occurrence in the inland or abroad with a possible impact on the Czech republic territory, the occurred crisis situation is being solved within the crisis (accident) response system, the basic diagram of which is given in the Fig. 11-2.

Fig. 11-1
Basic diagram of the Czech Republic emergency preparedness structure for the case of an extraordinary event occurrence

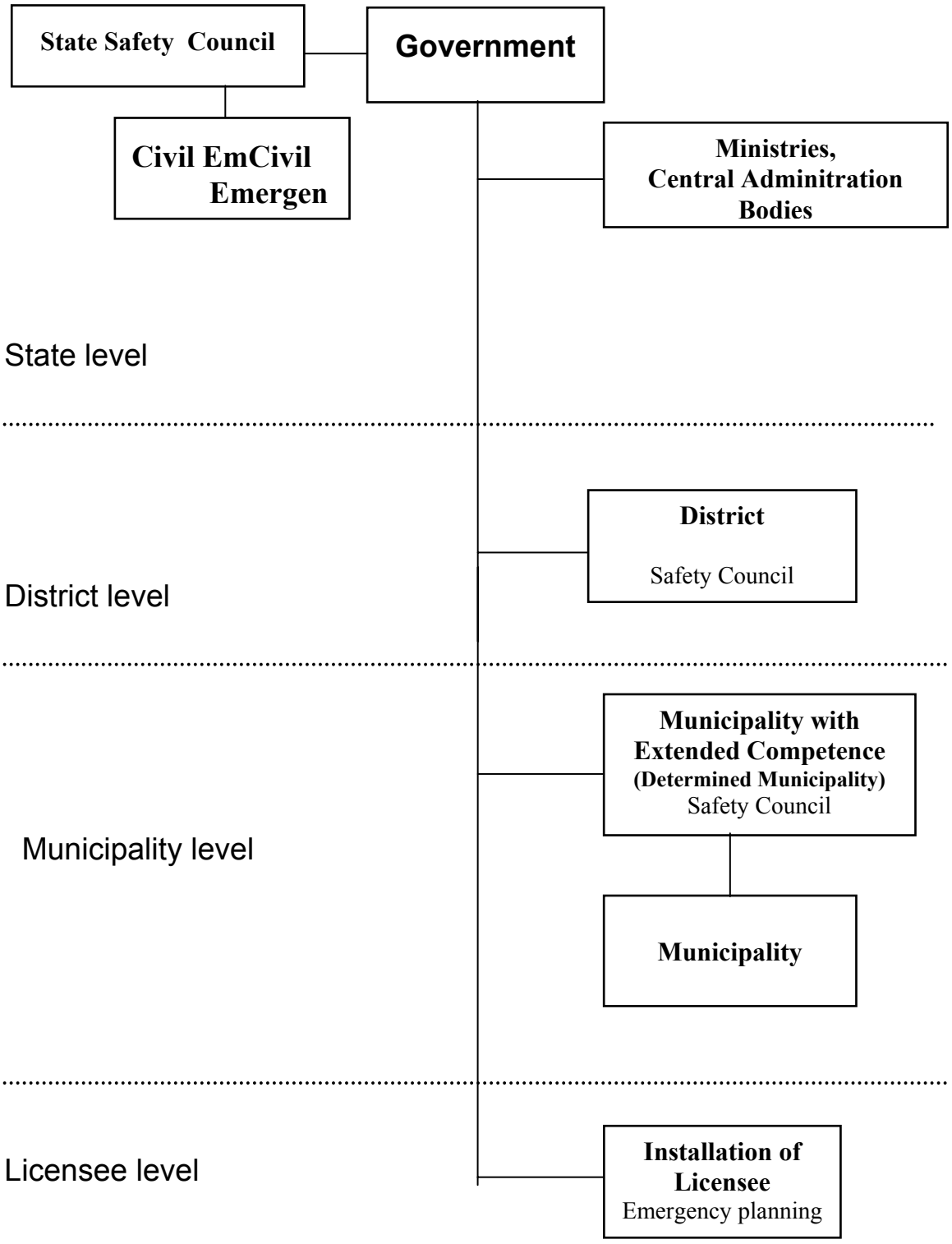
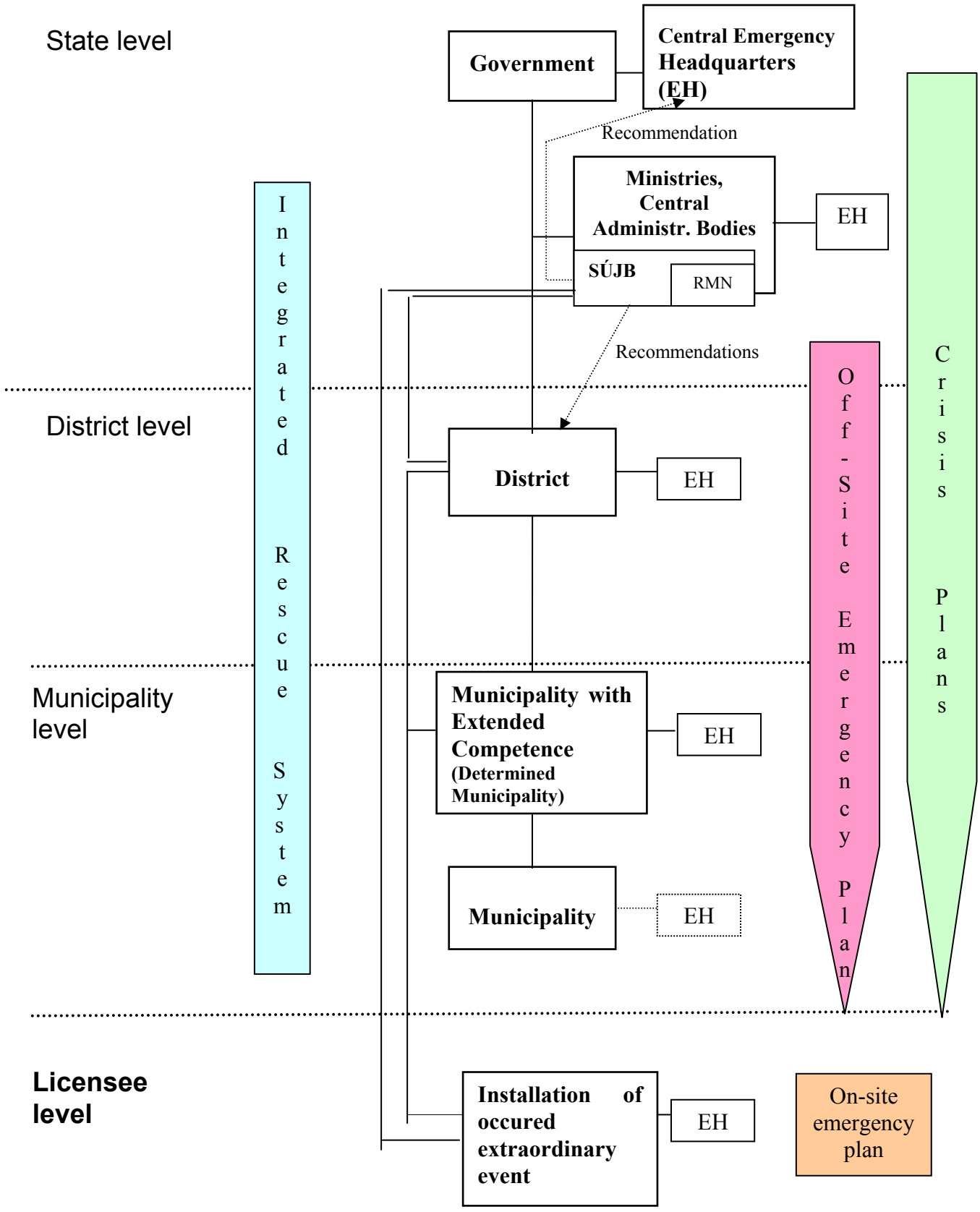

State Safety Council
Government
Civil EmCivil Emergen
Ministries, Central Adminitration Bodies
State level
District
Safety Council
District level
Municipality with Extended Competence
(Determined Municipality)
Safety Council
Municipality level
Municipality
Installation of Licensee
Emergency planning
Licensee level

Fig. No. 11-2
Basic diagram of the Czech Republic emergency response structure during a radiation accident occurrence



The Czech Republic government is the highest body, responsible for the crisis situations preparedness and in case of their occurrence for their solution in the territory of the Czech Republic. In the constitutional Act No. 110/1998 Coll., on the Czech Republic security, the State Safety Council was established. In consequence of this Act, the government established by its Decision No. 391 from the year 1998, Decree No. 813 from the year 2001 and Decree No. 741 from the year 2002 the composition of the State Safety Council, and specified its main tasks in the area of crisis preparedness and crisis situations solution.

Simultaneously with the Decision No. 391 from the year 1998 the Czech Republic government has established a Civil Emergency Planning Committee (VCNP) as a permanent State Safety Council working body for the coordination of the planning of measures to secure the protection of internal safety of the country, protection of the population and protection of the economy, and for the coordination of the requirements for civil resources necessary for further security of the Czech Republic. Tasks in the area of planning and preparedness for the case of radiation emergency occurrence come within the competence of the Civil Emergency Planning Committee and the areas of radiation accident solution within the competence of the Central Emergency Headquarters, which acts as a governmental body for the resolution of crisis situations.

The main tasks in the area of planning and preparedness to crisis situations, including radiation accidents, are specified in the Rules of the Civil Emergency Planning Committee. In the area of internal state safety protection, population protection and economy protection, they are directed in particular to:

- operative interdepartmental coordination of planning and preparatory activities,
- assessment and discussion of planning, conceptual and preparatory activities, presented by the central bodies of the state administration,
- assessment and discussion of requirements of the central bodies of the state administration for the civil resources,
- discussion and evaluation of interdepartmental amendment procedures for materials and submission of their discussions within the State Safety Council,
- assessment, discussion and coordination of the activities of the Czech Republic representatives in the NATO authorities and in other international subjects,
- processing and coordination of activities in the area of humanitarian aid and rescue works.

The chairperson of Civil Emergency Planning Committee is the Minister of Interior and the members of this committee are vice ministers and the SÚJB chairperson. The Committee has established expert working groups.

Experts (specialists) dealing with relevant areas of securing of population and environment protection in case of occurrence of emergency events (industry accidents, natural disasters etc.) are members of these expert working groups.

For securing the solution of occurred crisis situations including the radiation accidents on a national level a working body of the State Safety Council, the Central Emergency Headquarters is established. The chairman of the Central Emergency Headquarters is the Minister of Interior. The members of the Central Emergency Headquarters are vice ministers and top managers of other central bodies of state administration including the SÚJB chairperson.

The Central Emergency Headquarters is also activated both in case of radiation accidents of a nuclear installation outside the Czech Republic territory with the possibility of impact on the

Czech Republic, and during radiation accidents occurred during the transport of nuclear materials and radioactive substances.

On-site and off-site emergency plans of nuclear installations

On-site emergency plans of nuclear installations (licensees) are prepared in compliance with requirements for emergency preparedness assurance, and in the extent established by the SÚJB Decree No. 318/2002 Coll., as amended by the Decree No. 2/2004 Coll. The plans establish the following:

- organizational structure of the licensee and principles for management and implementation of interventions in the event of an extraordinary event occurrence. In this connection, the plans define the duties of persons and on-site organizational departments and units in case of an extraordinary event declaration, classified in accordance with their significance to the individual degrees of the classification system (refer to classification of extraordinary events),
- methods of announcement 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 (licensee) premises,
- methods of notification of the SÚJB and state administration bodies (District Authorities and municipalities with extended competence, to the territory of which extents 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 ensuring of warning of the public within the emergency planning zone,
- requirements for the radiation situation monitoring in case of extraordinary event occurrence both for the nuclear installation (licensee) premises and for its vicinity. The plans establish methods of notification and warning of the personnel and persons present in the nuclear installation (licensee) for the individual degrees of extraordinary events, and necessary measures are specified there for the protection of their health and lives, and for the limitation and reduction of their irradiation. These plans define principles and procedures of gathering, sheltering, evacuation, providing emergency first medical aid to all employees and persons affected, including medical provision and specialized medical care,
- procedures during the termination of the emergency events,
- procedures for management and implementation of interventions for designated persons and departments of a nuclear installation (licensee), including security of the protection of employees and persons established by the on-site emergency plan, as well as procedures for the notification of bodies and organizations affected by the on-site emergency plan, are processed in form of intervention instructions. The latter ones specify activities after the declaration of the corresponding degree of an extraordinary event including the necessary technical, instrumental, and material assurance.

Off-site emergency plans for the nuclear installations are elaborated in accordance with the requirements established by the Act No. 239/2000 Coll. and by the Ministry of Interior Decree No. 328/2001 Coll., as amended, for the specified emergency planning zone under coordination with the relevant District Authority in cooperation with municipalities with extended competency, the territory of which extend to the emergency planning zone. The licensee hands over the background information for the elaboration of the off-site emergency plan to the coordinating District Authority in order to assure the cohesion of the on-site emergency plan and the off-site emergency plan.

The off-site emergency plans are assessed by the Ministry of Interior – General Directorate of the Fire Rescue Brigade of the Czech Republic in cooperation with SÚJB.

The off-site emergency plans set down targets and methods of ensuring the individual types of protective countermeasures:

- notification of bodies and organizations,
- warning of people,
- sheltering people,
- evacuation of people, including dosimetric checks and decontamination at the exits from the endangered territory,
- regulation of persons movements within the endangered territory,
- health care.

Warning of the public within the emergency planning zone

After the District Authorities and municipalities with extended competency have been notified, the most important measure of both NPPs for the protection of the public is a warning of the public within the emergency planning zone which is with reflect to on-site emergency plan ensured by NPPs. Warning of the public is assured within the whole emergency planning zone, formed by a territory 20 km around the Dukovany NPP and 13 km around the Temelín NPP. The public is warned by a signal of sirens with following radio and TV broadcasting (transmissions) of the prepared initial information on the radiation accident occurrence, and on the countermeasures to be carried out (sheltering, iodine prophylaxis - taking KI tablets) and recommendation on the preparation for evacuation of people within 5 km internal zone around Temelín NPP and within 10 km internal zone around Dukovany NPP.

Iodine prophylaxis (KI tablets) is distributed in advance to the population within the emergency planning zone (households, schools, hospitals, and workplaces), when the District Authorities have approximately 10 % reserve of KI doses, and these preparations are on sale in pharmacies. The KI tablets held by the public are regularly exchanged by the licensee before their expiration date. Simultaneously the "Public Protection Manual" is distributed to the public within the emergency planning zone, which includes the basic information on activities of the public in case of radiation accident.

Schematic representation of the public warning system within the emergency planning zone is given in the Fig. 11-3.

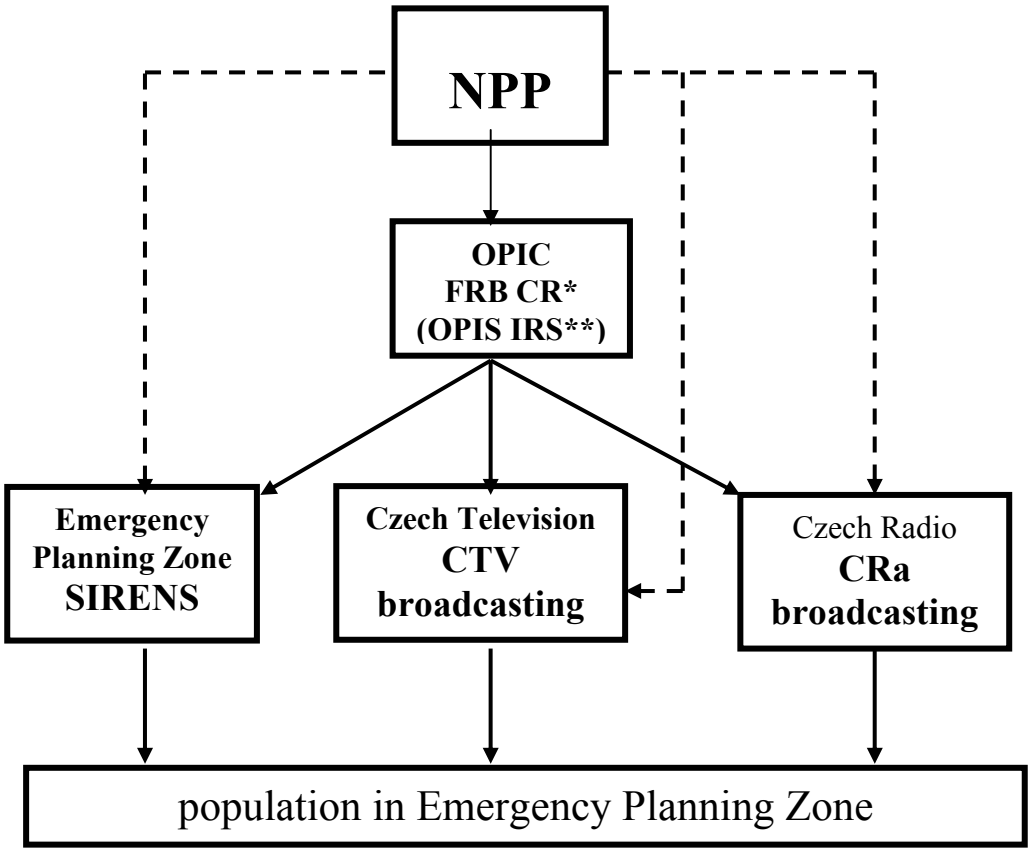
In accordance with § 3 of the Atomic Act, the SÚJB provides, based on the evaluation of the radiation situation in the case of radiation incidents and accidents, background documents for the decision-making about measures leading to the mitigation or elimination of irradiation in case of a radiation accident. These background documents are elaborated by the SÚJB Emergency Headquarters based on information submitted from the affected nuclear installation and from data provided by the National Radiation Monitoring Network; the SÚJB Emergency Headquarters carries out its activities in the premises of the SÚJB Emergency Response Center . In the sense of the Crisis Act, the SÚJB Emergency Response Center is thus an crisis management workplace.

In case of extraordinary event occurrence when using the background documents for the support of the decision making process, concerning the protective countermeasures using hardware, methodical and software tools located in the Emergency Response Center, the Emergency Headquarters, among others:

- evaluates the technology status development in relation to measures implemented by the nuclear installation operators,
- evaluates the radiation situation in the nuclear installation,
- elaborates, in collaboration with the Czech Hydrometeorological Institute, the prognoses of radioactive substances dispersion from the location of radiation accident occurrence, and information about a possible threat in the nuclear installation vicinity based on the meteorological situation and its presumed development,
- specifies the "source term" of the radioactive substances release and the extent of the affected territory.

Fig. No. 11-3
Schematic representation of the public warning system within the emergency planning zone

(The full lines mark the basic warning system; dashed line marks the backup system.)



* - OPIC FRB CR – Operation and Information Center of Fire Rescue Brigade of the Czech Republic

** - OPIC IRS - Operation and Information Center of Integrated Rescue System

The SÚJB Emergency Headquarters submits the elaborated background documents, depending on the size of the affected territory, to the Central Emergency Headquarters and to the District Emergency Headquarters.

Further the SÚJB Emergency Headquarters ensures:

- notification of the IAEA within the meaning of the "Convention on Early Notification of a Nuclear Accident" and the "Convention on Assistance in the Case of a Nuclear and Radiation Accident" and contact points of the countries based on the closed international bilateral agreements,
- notification of the EU within the meaning of the Council Decision No. 87/600/Euratom,
- providing the public with information.

Measures for providing the public with information, including emergency preparedness in nuclear installation vicinity

In the frame of informing the public within the emergency planning zones of both NPPs, the licensees prepared and the SÚJB approved the documents "Public protection manual for the case of a radiation accident at Dukovany NPP" and "Public protection manual for the case of a radiation accident at Temelín NPP", distributed by the NPPs each household.

The manuals contain information on the procedure the public shall follow after the warning signal within the emergency planning zone in case of the need for sheltering, application of iodine prophylaxis, and declaration of evacuation preparation, including determined evacuation routes depending on the meteorological situation. The NPPs provide the population each year with abridgement of these manuals in the form of a wall calendar.

The public receives information also at the "Information Centers of the Nuclear Power Plants", and the NPPs and SÚJB take on request of the relevant District Authorities part in the information campaigns organized by the District Authorities.

11.1.3 Training and exercise

Nuclear power plants have developed plans for the theoretical and practical training of their employees and other persons and units related to the occurrence of an extraordinary event of different degrees. Special plans of theoretical and practical training are prepared for persons and units assigned in the on-site emergency plan for management and implementation of interventions, with emphasis on their activities during an emergency event of a relevant degree, in accordance with the intervention procedures established by the on-site emergency plan as well as their developed intervention instructions. Exercises are carried out according to the yearly exercises plans aimed at verifying the management and implementation activities starting from the moment of an emergency event occurrence, in accordance with the established intervention procedures and intervention instructions.

Emergency preparedness in the emergency planning zone in accordance with the off-site emergency plan is also being verified with help of emergency exercises, in which units defined by the off-site emergency plan for the case of an extraordinary event of the 3rd degree participate.

Emergency exercises of the off-site emergency plan for the specified emergency planning zone are organized similarly in three activity phases:
preparatory: a scenario is elaborated for the scheduled exercise, establishing:

- goal, scope and duration of the exercise
- determination of the model radiation accident, its development and process,
- specification of the emergency response procedures,

- specification of intervening units and hardware engagement for the emergency response,
- determination of persons, who will evaluate the exercise and exercise observers,

implementation: the proper process of the exercise according to the prepared scenario in presence of all bodies, organizations and individual persons, responsible for the management and implementation of interventions, including the activities of the persons performing the evaluation or the exercise observers,

evaluation: elaborated in form of final protocol; protocols are filed as proof of the scheduled emergency exercise evaluation for long-term storage; for each calendar year all performed partial emergency exercises are evaluated in summary; the deficiencies, discovered during the exercise, are applied at:

- changes, modifications or detailing of the off-site emergency plan,
- amendments and modifications of emergency response interventions procedures,
- preparation of bodies, organizations and persons managing or implementing interventions during emergency response,
- addition of hardware, equipment and material,
- amendments or modifications of organizational assurance of the emergency response.

Coordination emergency exercises of ČEZ, a. s

The coordination emergency exercises common with the off-site emergency response bodies described in the last National Report continued in the period 2001 – 2003 as follows:

Name of exercise	**Site**	**Date**
MILÉNIUM 2001	Dukovany NPP	13. 3. 2001
VYSOČINA 2002	Dukovany NPP	10. 9. 2002
ZÓNA 2002	Temelín NPP	13. - 14. 3. 2002
PROTON 2003	Dukovany NPP	2. 4. 2003

All coordination exercises were performed based on the approved Emergency Exercise Plans submitted to SÚJB. The subject matter of the coordination emergency exercises was to verify the activities of personnel of the Dukovany NPP, or the Temelín NPP, emergency response organization as well as to practice the declared countermeasures (sheltering, evacuation) for the employees. Further the exercises verified the collaboration of both NPPs with the units of the integrated rescue system of the Czech Republic according to the principles indicated in the on-site and off-site emergency plans. The system of works organization of the individual units of the crisis management was practiced during the exercises.

The exercises were successful, they fulfilled their goals as well as the program, and proved good preparedness of the individual units of the emergency organization of the Dukovany NPP, or the Temelín NPP, for the solution of situations, the probability of occurrence of which is very unlikely.

In 2004 two similar coordination emergency exercises will take place (the first at Dukovany NPP and the second at Temelín NPP).

11.2 Statement on the implementation of the obligations concerning Article 16 of the Convention

The Czech Republic has adopted and implemented all measures ensuring that nuclear installations have regularly verified on-site and off-site emergency plans, and which cover activities to be performed in the case 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 of the Czech Republic as well as the competent bodies of states in the vicinity of nuclear installation, which may be feasibly affected by a radiation accident occurred in the nuclear installation on the territory of the Czech Republic, received the corresponding information for the preparation of emergency plans and mitigating interventions.

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, at its location in the given place;

(ii) For evaluating the likely nuclear 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 the licensing process, including a summary of national legislation

The description of the licensing process in general - for siting, designing, construction, operation and decommissioning of a nuclear installation is included in chapter 2.1.2 of the present National Report. The legislative framework applicable for issuing the site approval from the aspect of nuclear safety and radiation protection is represented by the Atomic Act and its implementing regulations:

- ***SÚJB Decree No. 215/1997 Coll.***, on criteria for siting of nuclear installations and very significant ionizing radiation sources,
- ***SÚJB Decree No. 214/1997 Coll.***, on quality assurance in activities related to the utilization of nuclear energy and in radiation practices, and establishing criteria for the classification and categorization of specified installations into safety classes,
- ***SÚJB Decree No. 307/2002 Coll.***, on radiation protection,
- ***SÚJB Decree No. 144/1997 Coll.***, on physical protection of nuclear materials and nuclear installations and nuclear facilities and their classification.

As further mentioned in chapter 3.1.2, siting of a nuclear installation is one of the activities, to which SÚJB has to issue an approval in accordance with the provision of § 9 of the Atomic Act, from the nuclear safety and radiation protection point of view. For issuing the approval under § 13 of the Atomic Act, the following preconditions apply:

- *an environmental impact assessment according to the Act No. 100/2001 Coll., on environmental impact assessment,*
- *an approval of the quality assurance program for the activity being authorized.*

Application for the nuclear installation siting must be, in accordance with the Appendix A of the Atomic Act, documented by the following documentation:

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

- description and evidence of suitability of the selected site from the aspect of siting criteria for nuclear installations and very significant ionizing radiation sources as established in an implementing regulation,
- description and preliminary assessment of the design concept from the viewpoint of requirements laid down in an implementing regulation for nuclear safety, radiation protection and emergency preparedness,
- preliminary assessment of the nuclear installation operation impact on the personnel, the public and the environment,
- proposal of concept for safe decommissioning,
- assessment of quality assurance in the process of the selection of site, the method of quality assurance for preparatory stage of the construction and the quality assurance principles for linking stages.

II. Analysis of needs and possibilities to provide physical protection

The SÚJB Decree No. 215/1997 Coll. establishes criteria for the assessment of the particular site suitability from the aspect of nuclear safety and radiation protection. At the same time, protection of other interests, resulting from the valid legislation, remains preserved. This Decree defines the exclusion and conditioning criteria.

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

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

In the implementing SÚJB Decree No. 195/1999 Coll., on basic design criteria for nuclear installations with respect to nuclear safety radiation protection and emergency preparedness, and particular in the SÚJB Decree No. 215/1997 Coll., on criteria for siting of nuclear installations and very significant ionizing radiation sources, IAEA recommendations and guidelines for nuclear installations siting are taken into account.

The above mentioned implementing regulations of the Atomic Act, in accordance with the IAEA recommendations, require that assessments within the siting process should consider the historically most significant phenomena registered in the particular locality and its vicinity, as well as a 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 initiated by human activity:

- earthquakes,
- climatic effects (wind, snow, rainfall, outdoor temperatures, etc.),
- floods and fires,
- air crash, and flying and falling objects
- explosions of industrial, military and transport means, including explosions in nuclear installations buildings,
- release of dangerous and explosive fluids and gases.

Based on probabilistic assessment some of these events may be excluded in case 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 fulfillment of the siting criteria for nuclear installation

12.1.2.1 Dukovany NPP

Geographic position of the site

The Dukovany NPP is located in the south-eastern part of the district of Třebíč, to the southwest from the Brno city on the right bank of the Jihlava river. The location of the site within the Czech Republic is shown in the map in the Fig. 1-1 (chapter 1). The power plant is located 45 – 50 km from the state border with Austria, with the shortest air distance to the border being 35 km. 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 above sea level. There are five smallish towns in the nuclear power plant vicinity – Třebíč, Náměšť nad Oslavou, Moravské Budějovice, Moravský Krumlov, and Jaroměřice nad Rokytnou. Brno city, with approximately 500,000 inhabitants, including suburban concentrations, is situated 35 km northeast to the plant. Within a 20 km radius approximately 108,000 inhabitants resident. Population density in other parts of the territory is very low, with only small settlements.

The site has been selected in a way to minimize 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 NPP is significantly lower than in other parts of the Czech Republic territory. The immediate vicinity of the nuclear power plant has an unequivocally agricultural character, and there are only a few small industrial works.

Protection against earthquake

Seismic assessment has been performed for the area determined by a circle with a radius of 200 km having its center in the nuclear power plant.

Geological surveys and knowledge of the bedrock under the cooling towers foundations are assessed as adequate. Surveys of the area under the reactor buildings I and II and the adjacent buildings were even assessed as adequate for one hundred percent. Constructions classified in the 1st category of seismic resistance (such as the reactor buildings) of the nuclear power plant are founded on a high quality underlying rock with the underground water below the level of foundations. The 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 a high quality bedrock, 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 (Final) Safety Report for the Dukovany NPP.

At the Dukovany site, the greatest possible effects of an earthquake may be expected, according to historical data, from the Alps seismic focuses. It results from analyses considering both the greatest possible magnitude of shocks and the most adverse attenuation of intensities from distances in the direction seismic focus – Dukovany that entirely theoretically a maximum of macro-seismic intensity, which may be expected at the Dukovany site, is 6° MSK. Calculation of the seismic risk has resulted in the limiting value of macro-seismic intensity of 5.8° MSK, which should not be exceeded even within 10,000 years period.

The region of interest, Dukovany NPP, is continuously monitored by the local seismic station Kozének and its records are continuously seismically evaluated by the Energoprůzkum Praha s. r. o.

Analyses performed at the same time confirmed the non-existence of any local tectonic activity. Actually no observed effects of any earthquakes were reported for Dukovany village. Closest local activities originated in Jindřichův Hradec area, where epicentral intensities did not exceed 5° MSK-64, and the macro-seismic fields of which did not reach the Dukovany region.

Based on the above details using the most conservative approach, the following seismic characteristics may be obtained:

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

It results unambiguously from the above-mentioned assessment that due to seismically entirely calm area and stability of the bedrock, the Dukovany NPP cannot 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, level SL-1 equals to 6° MSK-64 and level SL-2 equals to 0.1 g acceleration (which is in the conditions of Central Europe very high conservative estimate of the safe shutdown earthquake) were specified for the Dukovany site.

Protection against floods and adverse climatic phenomena

The largest river in the vicinity is the Jihlava river, at the north of the nuclear power plant, from which service 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 the Jihlava river, near the nuclear power plant a system of waterworks Dalešice – Mohelno, forming a pumped-storage hydro-electric power plant, was built. Jihlava river flow at the in-flow to waterworks Dalešice varies around the average annual value of 6 m^3s^{-1}.

An analysis of floods and prediction scenarios of floods show that the locality of the Dukovany NPP, in consequence of its position on a high plain lying on a higher level than the crests of dams of waterworks Dalešice – Mohelno, never was, and is not endangered even now, by floods.

Specific knowledge of the meteorological situation in the vicinity of the nuclear power plant is necessary to determine the influence of cooling towers and to assess the radioactivity spread; therefore special attention was paid to accumulate such knowledge. The nuclear power plant vicinity is located within the 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 frequent passages of atmospheric fronts. Specific meteorological measurements and observations at the site have been carried out continuously by the meteorological observatory of the Czech Meteorological Institute at Dukovany since June 1982. 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 taken into account in the design.

Protection against effects caused by aircraft crash

The airspace above the nuclear power plant has been proclaimed prohibited for all flights in the document "Flight Information Manual" which is binding on all users of the Czech Republic airspace.

The nuclear power plant is located in a close vicinity of military airfield Náměšť (approximately 10 km). The space above the nuclear power plant with a radius of 2 km and height of 1500 meters is a prohibited space for airplanes.

Probabilistic as well as deterministic analyses of the possibility and consequences of an aircraft crash of various categories were carried out. The analyses have shown that the power plant is sufficiently protected against the effects caused by both a military and a civil aircraft. Assessment of the protection against the effects caused by an aircraft crash was performed in accordance with the IAEA instructions. The results of the calculations have shown that the aircraft crash will not cause inadmissible destruction of the primary system because its civil structures, important for nuclear safety, are sufficiently resistant against possible impacts of such a crash. The analyses have also shown that the spatially isolated backed-up core cooling systems, together with civil protective structures, ensure that even an aircraft crash will not affect the function of the reactor emergency shutdown and cooling.

Protection against explosion pressure waves

Near the Dukovany NPP, in a distance of about 500 meters, there is a second-class road (No. 15) – Brno, Ivančice, Dukovany, Jaroměřice nad Rokytnou, Moravské Budějovice. Other roads in the vicinity are less frequented. The analyses have shown that even in the case of a very improbable explosion of a transport vehicle carrying a dangerous freight, plant safety will not be affected in any way.

The plant has a single-line railway from eastern direction Moravský Krumlov and Brno. The probability of a train accident of trains carrying dangerous freight, both in present and in long-term prospect is practically zero.

In the plant vicinity, there are no external sources of potential danger. The analyses have shown that a potential explosion of hydrogen during its transport and storage, which represents the predominant source of possible explosions within the Dukovany NPP premises, will not endanger equipment important for safety so that the safety function of the equipment will not fully fail. Higher attention is paid to the handling of hydrogen storage bins located outside the reactor units in order to minimize the possibilities of hydrogen escape.

Protection against influence of third parties

The nuclear power plant design takes into account also the protection against the 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, organizational and regime system of measures, which shall prevent the inadmissible influence of third parties.

12.1.2.2 Temelín NPP

Geographic position of the site

The Temelín site was selected at the seventies/eighties turn as a result of the evaluation of the parameters of the territory established by the Decree No. 4/1978 Coll., valid at that time. Location of the site in the Czech Republic is shown in the map in the Fig. 1-1 (chapter 1). The power plant is at a distance of 45 – 50 km from the state borders with Austria and the Federal

Republic of Germany. The nearest permanently inhabited locality is the village Temelín - at a distance of 2 km in northwest direction. The distance from Týn nad Vltavou with approximately 8,000 inhabitants is 5 km, and from the Vodňany town with 6,400 inhabitants is 14 km. The České Budějovice city is at a distance of 25 km and its population is approximately 100,000. Approximately 260,880 persons live within a radius of 30 km around the nuclear power plant, according to general census of the population in 2001. Population density in other parts of the territory is very low. Only small settlements prevail here.

Again, the site has been selected in a way as to minimize possible interactions of the nuclear installation with the adjacent territory. Thus, in the immediate vicinity there are neither large industrial facilities, with exception of pipeline of the transit gas line, nor frequented transport routes. The density of industrial facilities in South Bohemia is significantly lower than in other parts of the Czech Republic territory. The immediate vicinity of the nuclear power plant has an unequivocally agricultural character, and there are only a few small industrial works. No industrial development in 10 km area in the perspective up to 2020 is planned.

Protection against earthquake

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

The geological bedrock of the locality is represented by South-Bohemian branch of the Molanubikum and the 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 rock forming cycle. The most frequent rocks here are gneiss, granites and quartz. The plant site has a rock substratum; the main buildings of the power plant are positioned on a homogeneous block with a size exceeding 500 x 500 m. 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 under interest, delimited by a circle of a 300 km radius having its center in the power plant. The biggest part of this area lies within the Bohemian massif territory, in the south and southeast it reaches the Alps-Carpathian region. The Moldanubikum under the NPP is the oldest and strongest 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.

The earthquake catalogue was supplemented in accordance with the IAEA recommendation 50-SG-S1 rev. 1. It is one of the important reference documents of the Pre-operational (Final) Safety Report, and starts with the year 1550.

It results form the assessments based on the greatest possible shocks in the focus areas located in the concerned area and most adverse attenuation of intensities with the distance seismic focus – NPP that the limiting value of macro-seismic intensity which should not be exceeded with 0.95 probability even within 10,000 years period is 6.5^{o} MSK-64, which corresponds to 0.1 g in the conditions of Central Europe. The design acceleration was 0.1 g, which is fully conforming to the IAEA recommendations issued in 1991. These values have been used both in the design and construction of the buildings and equipment necessary to ensure a safe shutdown of the reactor, removal of residual heat and prevention of radioactive substance releases (classified in the category 1 of seismic resistance).

Protection against external floods and adverse climatic phenomena

Operation of the power plant is primarily dependent on the Vltava river, from which service 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 reservoirs which had been built on it years ago, forming the so called Vltava river cascade, it serves to protect against flooding and some of them help to generate hydroelectric power. A significant benefit provided by the cascade reservoirs is the equalization of the minimum flows. For the needs of the NPP Temelín, two water reservoirs were added to this cascade: Hněvkovice from which process water is taken, and Kořensko, which is used to mix the discharged waste water with Vltava water.

Analysis of floods and prediction scenarios of floods show that the locality of the Temelín NPP has never been flooded, and is not endangered by floods. The main plant buildings, housing equipment important for nuclear safety, are built at the altitude of 510 m above sea level. It results from the assessment of historic extreme flows that the power 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 the Vltava river. A break of the Lipno I dam will cause a 1460 m^3s^{-1} flow in the Hněvkovice profile, which will not affect either the Hněvkovice dam nor the pumping stations of service water.

Specific knowledge of the meteorological situation in the vicinity of the nuclear power plant is necessary to determine the influence of the cooling towers and to assess the radioactivity spread; therefore special attention was paid to accumulate such knowledge. The vicinity of the nuclear power plant is located within the 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 the 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 a distance of 3 km from the nuclear power plant in the northwest direction. The measurements were started in April 1988, and are carried out continuously since January 1989.

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

Protection against effects caused by aircraft crash

The airspace above the nuclear power plant with a radius of 2 km and height 1500 m has been proclaimed prohibited for all flights by the "Flight Information Manual". The nearest flight corridor is situated 18 km from the power plant. Thus, air traffic has no effect on the nuclear power plant. The military airfield at Bechyně, located 25 km from the plant, was liquidated.

Calculations have shown that the power plant is protected against the effects caused by a military and civil aircraft crash. An assessment of these effects was performed in accordance with the International Civil Aviation Organization (ICAO) guidelines. The results of the calculations have shown that the aircraft crash would 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 waves

Around the nuclear power plant three branches of the transit gas line of 1400, 1000 and 800 mm diameter are situated. Their minimum distance from the plant reactor buildings is about 900 m. Transit gas line transports natural gas. Analyses have shown that even the maximum postulated accident on the gas line (simultaneous break of all three branches) would not impair the functions of the buildings and technological equipment. A series of measures was adopted to reduce the probability of a pipe accident occurrence and for the mitigation of possible consequences. The principal ones are the additional implementation of spherical valves, shortening of isolable gas pipe sections, and also a system for natural gas leakage monitoring. Calculations and analyses performed by professional organizations and research institutes were assessed positively by the SÚJB.

At the southeast boundary of the site is a frequented secondary road No. 105 České Budějovice – Týn nad Vltavou. Other roads in the plant close vicinity are less frequented. At a distance of more than 10 km, there are two sections of international roads used also for transportation of hazardous freights (ARD). However, the analyses have shown that even in 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 about 1.4 km from the power plant is the local railway line Číčenice – Týn nad Vltavou with passenger and goods trains. Passenger trains are very infrequent. On this line, the probability of an accident of trains carrying dangerous goods both at present and in long-term prospect is practically zero.

Protection against influence of third parties

The nuclear power plant design takes also into account protection against the 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, organizational and regime system of measures preventing the inadmissible influence of third parties.

12.1.3 Activities leading to the preliminary assessment of nuclear energy installations siting

The SÚJB Decree No. 215/1997 Coll., requires that the impacts of the external events mentioned above should be re-evaluated, either after a certain time of operation or within the framework of the regular revisions of the safety documentation, applying a most advanced scientific and technical tools and taking into account any changes which have occurred at the locality.

Up to the present, this impact re-evaluation has been performed over a ten-year period representing the period for which the license for a nuclear power plant operation is issued in the Czech Republic. Issues related to siting criteria are also the subject of periodic safety evaluation performed in accordance with the IAEA document No. NS-G-2.10 Periodic Safety Review of Nuclear Power Plants.

12.1.4 Assessment of environmental impact of a nuclear power plant

The environmental impact of the Dukovany NPP was minimized and it is permanently observed, monitored and controlled. The priority of the power plant management is a protection of a healthy environment documented by the introduction of the Environment Management System (EMS), which was re-certified by the company Det Norske Veritas in November 2003. This periodic audit found a correspondence with the standard ČSN EN ISO 14 001, and approved thereby an authorization to hold the certificate issued based on the

Dutch accreditation RvA recognized worldwide. The Environment Management System has been introduced also in the Temelín NPP, similarly to the Dukovany NPP.

In the Temelín NPP the environment components are monitored in compliance with the requirements of the legislation and, besides, according to a special extended Program of Environmental Impact Monitoring and Assessment already for many years. This allowed obtaining basic information prior to putting the power plant into permanent operation, which will be used for reference levels. For details, refer to Chapter 10 "Radiation protection".

The above-mentioned "Program of Environmental Impact Monitoring and Assessment", which has been performed since 2000, covers all environmental areas, i.e. atmosphere and climate, surface waters, soil, geo-factors and underground waters, agro systems, ionizing radiation and the public. The program was elaborated by the company Investprojekt Brno and the individual areas were elaborated by the representatives of Universities and research Institutes. The employees of the Academy of Sciences of the Czech Republic represented opponents of the proposal for the "Program". The program was approved in 1999 and the Temelín NPP assures its fulfillment starting from the subsequent year. The environmental status before the Unit 1 commissioning, i.e. by 2000, was evaluated, the data statistically processed and it forms the "zero", in other words pre-operational, environmental status. Data measured after the putting of Unit 1 into operation are and will be related to this status.

The results of the monitoring and assessment are summarized each year in an annual report, elaborated by the individual solvers of the "Program".

During construction, in accordance with the newly adopted legislation, the Environmental Impact Assessment (EIA) was performed for all substantial design changes. The Ministry of the Environment issued a positive opinion to this assessment.

In addition, in the frame of the Melk protocol closed in December 2000 between the prime ministers of the Czech republic and Austria with the presence of the EU commissioner for the enlargement, another additional assessment of the nuclear plant impact on the environment was performed in the time period January – June 2001. This assessment was performed in accordance with the applicable EU regulations dealing with the assessment of the impact of projects on the environment.

Possible impact was monitored in the following areas:

- climate and atmosphere
- hydrology
- geology and seismicity
- impact on the population health
- influence on the nature and landscape
- wastes (including the radioactive ones) and possibilities of emergencies

The Commission appointed by the government of the Czech Republic and having performed the assessment concluded that "the environmental impact of the Temelín NPP is small, insignificant and acceptable". In the conclusion, the Commission recommended 21 measures aimed in particular at intensifying the monitoring of all influences during the future plant operation. The measures are continuously fulfilled and assessed.

Both EIA processes were accompanied by a proper public hearing, where all questions and comments raised by the public of the Czech Republic, Austria and Germany were answered.

12.1.5 International agreements with neighboring countries

In accordance with bilateral intergovernmental agreements with the Federal Republic of

Germany and with Austria, the Czech Republic submits to the governmental bodies of these states information on its nuclear installations, situated near common border. Information is transferred regularly, during annual bilateral meetings (yearly meetings), and irregularly, within the agreed meetings, or in writing.

During the above-mentioned Melk process, during which also Temelín NPP safety issues were discussed, an unprecedented amount of information was submitted to the Austrian party concerning the design, safety analyses, and the analyses of the environmental impact of the operation. In the safety issues area, the Czech Republic cooperates also with other neighboring countries, in particular with the Federative Republic of Germany.

The Czech Republic has also signed a general intergovernmental agreement on the exchange of information from the field of the utilization of nuclear energy with another neighboring countries.

12.2 Statement on the implementation of the obligations concerning Article 17 of the Convention

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 probable environmental impact. At the same time, it introduces the regular re-evaluation 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 (defense 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 the licensing process including a summary of the national legislation

A general description of the licensing process for siting, design and construction, operation and decommissioning of a nuclear installation is the content of the chapter 2.1.2.

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

- ***SÚJB Decree No. 195/1999 Coll.***, on basic design criteria for nuclear installations with respect to nuclear safety radiation protection and emergency preparedness,
- ***SÚJB Decree No. 214/1997 Coll.***, on quality assurance in activities related to the utilization of nuclear energy and in radiation practices, and laying down criteria for the assignment and categorization of classified equipment into safety classes,
- ***SÚJB Decree No. 307/2002 Coll.***, on radiation protection,
- ***SÚJB Decree No. 144/1997 Coll.***, on physical protection of nuclear materials and nuclear installations and nuclear facilities and their classification.

As further mentioned in chapter 3.1.2, construction of a nuclear installation is one of the activities to which SÚJB has to issue an approval in accordance with the provision of § 9 of the Atomic Act, from the nuclear safety and radiation protection point of view. For issuing the nuclear installation construction permit under § 13 paragraph 5 of the Atomic Act, the following preconditions apply:

- approval of a quality assurance program for the approved activities,
- approval of a quality assurance program for the design.

Application for an approval for a nuclear installation construction must be in accordance with the Appendix B of the Atomic Act documented by the following documentation:

I. Pre-operational (Final) Safety Report, the content of which shall include:

- evidence that the proposed solution, given by the design, meets all requirements for nuclear safety, laid down in implementing regulations,
- safety analyses,
- data on the presumed lifetime of the nuclear installation,
- concept of a safe termination of operation and decommissioning of the approved nuclear installation, including nuclear waste disposal,

- concept of spent nuclear fuel management,
- 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 linked phases,
- list of classified equipment.

II. Physical protection assurance proposal.

After positive assessment of the above documentation SÚJB will issue the construction permit, whilst the list of classified equipment and physical protection assurance proposal are subject to a separate approval by the SÚJB.

13.1.2 Dukovany NPP

Basic nuclear safety principles included to the nuclear power plant design, including the application of the defense-in-depth strategy

Technological description of the Dukovany NPP units is given in the Annex 1.

The safety 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 must provide for the protection of operators and the 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 standards of the former USSR. The document "Technical Substantiation of Safety" (1974) served as a basis and already before putting of the Dukovany NPP into operation a series of Czech and Russian normative regulations, which were taken into account when elaborating the original technical design into the particular design of the Dukovany NPP, was issued.

When comparing the provisions of the above binding regulations during the series of analyses performed for units with the VVER-440/213 reactors at the beginning of the nineties with the current requirements for design documentation, it is possible to state that the Czechoslovak legislation of the eighties (and in principle also the regulations of the former USSR, which were subjected to similar development) was on a very good level. Generally, the requirements conformed to the contemporary understanding of nuclear safety, and principles and criteria included in the legislation, to a considerable extent, coincide with the current ones.

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

The design considers technical and organizational measures to assure nuclear safety in the event of a single failure of the normal operating equipment simultaneously with an undetected long-term failure of other normal operating equipment. Simultaneously with the normal operating equipment failure, the failure of one independent safety division is investigated. The safety analyses included in the Safety Analysis Reports are performed for the defined set of initiating events.

The Dukovany NPP design respects the defense-in-depth concept defined in the IAEA document INSAG-3 and its revision INSAG-12. It is based on several protection levels, which include the consecutive physical barriers, preventing radioactive release into the

environment:

- Level 1: 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 emergency management, including localization system,
- Level 5: Off-site emergency planning.

The most complex international assessment of VVER-440/213 units, in the light of defense-in-depth implementation, has been performed within the Extra budgetary IAEA program in the period of 1991 - 1998 (see chapter 1). The program was organized 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 defense-in-depth degradation. Output document [1-6] of the program comprised also recommendations for elimination of established deviations.

From these general findings, the NPP has subsequently selected the ones relevant in particular for the Dukovany design, and has elaborated a program of measures for their elimination. The majority of the corrective measures have been already implemented before the elaboration of the National report (all of them with higher priority). An international group of experts within the framework of the IAEA mission in 1996 organized for that purpose, has positively assessed the program of corrective measures implementation (refer to [1-7]).

The results of the Dukovany NPP design assessment, Operational safety report and its periodic revisions, and successful implementation of the corrective measures program are considered as one of the main evidences that the design and the construction of the nuclear installation provide several reliable protection levels and approaches (defense-in-depth) against radioactive material release aimed at preventing accidents and mitigating their possible radiological consequences.

Human factor and man - machine interface related design features

The operation of the Dukovany NPP units has 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 minimize the possibility of a human factor error and to improve the man-machine interface, especially in the process control system. Additional modifications are scheduled within the Modernization Program of the Dukovany NPP (refer to the Annex 5). These modifications were implemented, or are focused both on the main control rooms and on the simplification of regular performance tests of individual equipment. Some of the prepared modifications increase the share of automatic control and thus contribute to the reduction of the number of necessary operator interventions and consequently to the reduction of the 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 main control rooms are very significant. The main control room concept in the VVER-440/213 units, in its Dukovany NPP specific modification, provides:

- very good overview of the equipment condition, which enables a fast and easy orientation of the main control room personnel during normal operation as well as during transients. The original situation has been improved further by changes in the instruments ergonomic design implemented as a result of the operators initiative,
- easy and fast equipment control from the main control room,

- appropriate design of the failure and emergency warning systems which contributes to timely and correct identification of failures. Innovations were implemented with emphasis on improvement of the man-machine interface,
- appropriate combination of analogy (classic) type of the main control room with digital elements – computer based equipment, which is gradually implemented to the main control room. More extensive computerization in the main control room improves the personnel's work efficiency and has a favorable effect on the man-machine interface and thus limits possible errors due to "human factor". This concerns in particular a series of supporting computer programs performing auxiliary calculations enabling to utilize the documentation in digitized form, etc.,
- in the communication area – the original design was supplemented by up-to-date digital telecommunication means. This improved significantly the communication between the unit main control room personnel and service personnel during the handlings controlled from the main control room.

13.1.3 Temelín NPP

Basic principles of nuclear safety included in the nuclear power plant design, including application of the defense-in-depth strategy

Technological description of the Temelín NPP units is given in the Annex 1 to the National Report.

At the present time the design is completed and modified so that both units have been, in the moment of their commissioning, on a level fully comparable with up-to-date nuclear power plants in Western Europe and in the USA as to the level of nuclear safety assurance and other properties.

The basic design of the Temelín NPP units 1 and 2 was elaborated by the Czech design organization Energoprojekt (EGP) Praha. Already before 1989, the inland experts have analyzed and modified the original design. Further technical improvements have resulted from the IAEA expert opinions, SÚJB recommendations, proposals from the future operator and from many Czech experts and from the results of the External Audit performed by the company NUS Halliburton. Their implementation brought the technical level of units 1 and 2 of Temelín NPP into compliance with western nuclear power plants standards according to requirements of the end of the nineties.

Design changes were then verified by new analyses performed with advanced western computer codes, both in depth and structure conform to the requirements of western standards. Significant changes of the design are described in the in the chapter 1.1.3.2.

To reach and to maintain the required level of nuclear safety, the Temelín NPP is designed to be compliant with generally applicable regulations for nuclear safety assurance, and fulfils following safety principles and functions:

- capability to shutdown safely the reactor and to maintain it in conditions of safe shutdown under all operating modes and events anticipated in the design,
- capability to remove residual heat from the reactor core under all operating modes and events anticipated in the design,
- capability to minimize any possible leakage of radioactive matter in a way not to exceed the stated limits in all operating modes and events anticipated in and after the design.

Observance of these general principles is achieved by adhering consistently to the defense-in-depth principles and by fulfilling safety functions as described in the IAEA Safety Standards

and in the INSAG 12 document. Personnel and the vicinity of the nuclear power plant are protected against consequences of any serious accidents by physical barriers comprised of:

- nuclear fuel matrix (practically all fission products are retained within the matrix of the uranium dioxide pellets),
- fuel rods cladding (fuel cladding is made of the special alloy Zircaloy to remain hermetic over the whole time of utilization and thus preventing the fission products release),
- primary circuit (reactor pressure vessel and the primary circuit represent a barrier resistant to pressure load, heat and radiation exposure),
- 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 an accident related with the integrity damage of the preceding barriers).

In 1996, a special mission of the IAEA checked how the innovated design of the Temelín NPP reacts to the IAEA safety issues, generic for nuclear power plants with VVER-1000/320 reactors described in the IAEA document [1-15], [1-16].

Individual safety issues were, similarly as in the case of units with VVER-440/213 type reactors, categorized in accordance with the defense-in-depth possible violation viewpoint. The mission evaluated the design, implementation of modifications recommended earlier, and the preparation for operation, including the issue of the design compatibility (implementation of western technology into the original design). The mission recognized a general improvement of the Temelín NPP design. The mission emphasized that the combination of eastern and western technology was considered with great care. In some cases combination of eastern and western technology led to a higher safety improvement compared to international practice.

In November 2001, repetitive mission review took place aimed at solving safety findings identified by the IAEA in 1996.

In conclusion of the mission it was stated that the majority of recommendations were implemented in the Temelín NPP on a very good level. For a few issues, the intent of the IAEA recommendations has not yet been met in full. However all these pending issues have been addressed and measures are at an advanced stage of implementation to complete their resolution. The status of these issues is judged not to preclude the safe operation of the Temelín NPP. These conclusions and positive result of the above-mentioned expertise confirm that the Temelín NPP design follows sufficiently the defense-in-depth concept. Simultaneously the mission stated that the Temelín NPP exceeds in some areas the usual safety standard.

13.2 Statement on the implementation of the obligations concerning Article 18 of the Convention

The legislation valid in the Czech Republic and its implementation in practice is compliant with the requirements of Article 18 of the Convention. The operated Dukovany NPP and Temelín NPP are designed with respect to the defense-in-depth concept against radioactive substance release with the goal to prevent occurrence of accidents and to mitigate their radiation 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 authorization to operate a nuclear installation is based upon an appropriate safety analysis and a commissioning program 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) Program to collect and analyze 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 organizations 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 description of the licensing process, in general for siting, designing and construction, operation and decommissioning of nuclear installation is given in the chapter 2.1.2.

The legislative framework for approval of the operation of a nuclear installation from the nuclear safety and radiation protection point of view is established by the Atomic Act and its implementing decrees, in particular:

- ***SÚJB Decree No. 106/1998 Coll.***, on nuclear safety and radiation protection assurance during commissioning and operation of nuclear facilities,
- ***SÚJB Decree No. 214/1997 Coll.***, on quality assurance in activities related to the utilization of nuclear energy and in radiation practices, and laying down criteria for the assignment and categorization of classified equipment into safety classes,
- ***SÚJB Decree No. 307/2002 Coll.***, on radiation protection,
- ***SÚJB Decree No. 144/1997 Coll.***, on physical protection of nuclear materials and nuclear installations and nuclear facilities and their classification,
- ***SÚJB Decree No. 318/2002 Coll.***, on details of emergency preparedness of nuclear facilities and workplaces with ionizing radiation sources and on requirements on the content of on-site emergency plan and emergency rule, as amended by the Decree No. 2/2004 Coll.

As it was said in chapter 3.1.2, commissioning and operation of a nuclear installation are activities for which SÚJB authorization is required under the provision of Section 9 of the Atomic Act as to nuclear safety and radiation protection. According to Section 13 of the Atomic Act approval of a quality assurance program for the practice being licensed is a prerequisite for the issue of a license for commissioning and operation of a nuclear installation.

Commissioning

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

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

- Time schedule for work in a given stage;
- Program for the stage in question;
- Evidence that installation and personnel are prepared for the stage in question;
- Evaluation of results of the preceding stage;
- Method by which physical protection is to be provided.

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

I. Pre-operational (Final) Safety Report, which shall include:

- Description of changes of the 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;
- Supplementary and more precise evidence of nuclear safety and radiation protection provisions;
- Limits and conditions for safe operation of the nuclear installation;
- Neutron-physics characteristics of the nuclear reactor;
- Method of radioactive waste management;
- Quality assessment of classified equipment.

II. Further documentation, which shall include:

- Evidence that all prior decisions and conditions of the SÚJB were fulfilled;
- Time schedule for nuclear fuel loading;
- Program for nuclear fuel loading;
- Evidence that installation and personnel are prepared for nuclear fuel loading;
- Evaluation of the results of previous stages;
- On-site emergency plan;
- Changes in the provision of physical protection;
- Program of operational inspections;
- Proposed decommissioning method;
- Cost estimate for decommissioning.

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

- Time schedule for work in this stage;
- Program of this stage;
- Evidence that installation and personnel are prepared for the stage in question;
- Evaluation of results of the previous stage.

After a positive evaluation of the above-mentioned documentation, SÚJB issues the approvals for the individual phases of the reactor commissioning, whilst the program of the phases,

proposed physical protection method, changes in physical protection assurance, proposed decommissioning method, on-site emergency plan, program of in-service inspections, as well as the Limits and Conditions for safe operation of a nuclear installation, are subject to a separate approval by the SÚJB.

Operation

Application for issuing the authorization for the nuclear installation operation must be, in accordance with Appendix D to the Atomic Act, accompanied with the following documentation:

- Supplements to the Pre-operational (Final) Safety Report and further supplements to documentation required for the issue of a license for the first nuclear fuel loading into the reactor, relating to changes carried out after the first nuclear fuel loading;
- Evaluation of results of previous commissioning stages;
- Evidence of implementation of previous decisions and conditions of the SÚJB;
- Evidence that installation and personnel are prepared for operation;
- Operation time schedule;
- Up-dated limits and conditions for safe operation.

After positive evaluation of the above-mentioned documentation, SÚJB issues the authorization for nuclear installation, whilst changes in the documentation, approved in previous stages, are subject to a separate approval by the SÚJB.

Although the authorization for operation under the Act is not time-limited, SÚJB issues during the operation, in accordance with the Section 9 paragraph 1 letter e), authorization for restarting a nuclear reactor to criticality after a nuclear fuel reload, based on review of the documentation submitted in accordance with Appendix E to the Atomic Act, i.e.:

- Neutron-physics characteristics of the reactor;
- Evidence that installation and personnel are prepared for restart of the nuclear reactor to criticality, including preliminary evaluation of in-service inspections;
- Time schedule for subsequent operation.

14.1.2 Limits and Conditions for safe operation

Establishment of the Limits and Conditions for safe operation is required by the existing legislation – the Atomic Act and a set of its implementing decrees, as one of the basic documents for issuing authorization of the first nuclear fuel loading into the reactor and for subsequent operation of the nuclear installation.

A concept of the Limits and Conditions for safe operation has been formulated as early as in 1982, following an initiative of the regulatory body. The concept was based on the US NRC reference guide [14-1] for nuclear power plants with pressurized water reactors.

Since that time, the Limits and Conditions have been systematically developed and detailed modified in accordance with the latest results of the development and research and with application of experience in operating individual NPP units.

The Limits and Conditions for safe operation contain a set of data on:

- acceptable parameters,
- requirements for equipment operation ability,
- protection systems settings.

The Limits and Conditions for safe operation include the following categories of data:

- safety limits,
- protection systems settings,
- limits and conditions for the operation,
- requirements for checks,
- organizational measures,
- justification of the Limits and Conditions.

In case any deviation from the Limits and Conditions occurs during the operation, responsible persons shall take immediate measures to restore the compliance as soon as possible. If the compliance cannot be restored and possible consequences of the deviation are significant for nuclear safety, the reactor must be tripped and cooled down. The operator is obliged to inform the regulatory body of nuclear safety, subsequently an analysis of the Limits and Conditions violation is performed and measures preventing repetition of such event are proposed.

Limits and Conditions of the Dukovany NPP

The first version of the Limits and Conditions for the Dukovany NPP units was put into use in 1983 as a first application for VVER reactors elaborated in accordance with the US NRC reference guide [14-1]. Since that time, the Limits and Conditions have been continuously developed and detailed modified. The Limits and Conditions were revised following an issue of the amended Atomic Act. These Limits and Conditions were put into force in 2001. The NUREG 1431 document was taken into account during the revision.

The Limits and Conditions are based on calculation, data and experimental analyses are also based on operational experience not only from the Dukovany units with the VVER 440/213 reactors, but also from units in other countries (Slovakia, Hungary, Russia). Requirements of the Limits and Conditions are based on the prerequisites of safety analyses, documenting the plant safety at abnormal and emergency conditions (deterministic approach) and they take into account the PSA results (probabilistic approach).

Contents and internal segmentation of the Limits and Conditions are compliant with the requirements of the Atomic Act and the SÚJB Decree No. 106/1998. Justification of the Limits and Conditions are an integral part thereof. This document is directly approved by the SÚJB. The Limits and Conditions are also part of the Pre-operational (Final) Safety Report.

Limits and conditions of the Temelín NPP

Limits and conditions of the Temelín NPP were elaborated in accordance with the NUREG 1431 document and their requirements are based on the prerequisites of safety analyses, documenting the plant safety at abnormal and emergency conditions. Contents and internal segmentation of the Temelín NPP Limits and Conditions are compliant with the requirements of the Atomic Act and the SÚJB Decree No. 106/1998. Limits and Conditions of the Temelín NPP are part of the Pre-operational (Final) Safety Report. The Limits and Conditions were approved by SÚJB as an independent document within the licensing procedure for the authorization of the first fuel loading into the reactor core. Limits and Conditions documentation, which is used by the plant personnel, is composed of two parts:

1) Limits and Conditions for safe operation
2) Substantiation of the Limits and Conditions for safe operation

Each system in the Temelín NPP is classified either as "important" or "unimportant" for the safety. Systems important for the safety are such systems, the availability for operation of which ensures the fulfillment of any of the safety functions. Systems important for the safety are divided in two subcategories:

1) safety systems
2) safety related systems

Both these subgroups are covered with requirements of Limits and Conditions. Safety systems may further be classified as protection (actuating) systems, actuators (which are being actuated in case a certain predetermined value is exceeded) and supporting systems. Similarly it is possible to perform this division also for safety related systems. Here the actuators are controlled by control systems of safety related systems rather than by protection systems (limitation system, reactor control system etc.).

From the first fuel loading into the reactors of both units the approved Limits and Conditions were during the commissioning and during the trial operation several times modified with the changes approved separately. The necessity of performing these changes resulted from the performed approved equipment modifications and from the operational experience.

This whole process resulted in submission and approval of a new revision of the Limits and Conditions document containing all changes arising from the implemented approved equipment modifications and from the operational experience. This new revision of the Limits and Conditions was put into force on April 1, 2004 and it is identical for both Temelín NPP units. At the same time the Limits and Conditions justification is continuously updated, which is an integral part of the Limits and Conditions document.

14.1.3 Operation, maintenance, inspections and tests of nuclear installation

Operation

Units of both power plants are operated in accordance with internal decrees and the Limits and Conditions for safe operation. These documents are continuously and systematically updated and upgraded. The compliance with the documents is continuously monitored through the implemented control system and so called "feed-back" system (see chapter 14.1.7).

Internal audit of the electricity company ČEZ, a. s. in the Dukovany NPP has confirmed that the process of feedback from internal and external events (IRS-IAEA/NEA, WANO, VVER) is functional and effective. Internal audit did not propose any corrective measures or improvements of the current status. Temelín NPP verification by the OSART mission and the follow up OSART mission in the field of feedback system did not find any significant deficiencies in the process of events investigation and corrective measures fulfillment.

The system catches all necessary and usable events. The plant personnel are familiar with the system and the system is used for the correction of discrepancies and defects. A great number of workers from all plant departments are involved in the process of identifying the causes of the problems and proposing effective corrective measures. The number of safety relevant events decreases already for several consecutive years.

In the Dukovany NPP as well as in the Temelín NPP a system of WANO safety indicators evaluation is implemented, continuously providing information about the standards in the monitored areas in other NPPs in the world. Gathered information is used to recognize own level of the Dukovany NPP and the Temelín NPP in the individual indicators of the safety and operation status. An overview of safety indicators of all Dukovany NPP units in the years 1998-2003 is given in the Annex 6.

Causes for repeatedly occurring events are evaluated on a regular basis. In events discussed by the commission for the investigation of events (safety relevant) no repeatedly occurring events were identified. Repeated events (problems) monitored in the category of small events

(without a direct impact on nuclear safety) are also regularly evaluated in the annual report and their elimination is continuously monitored and evaluated (see chapter 14.1.6).

Corrective measures fulfillment success rate is also part of regular yearly evaluation of the feedback in the power plant. In the past period it was possible in most cases to fulfil the corrective measures and eliminate thus the causes of discrepancies in the scheduled dates.

Legislations related to the external feedback process were updated in accordance with the requirements resulting from the real assessment, evaluation, and external information utilization process. A new guideline of principles describing the contact of Dukovany NPP with the WANO organization was issued. Temelín NPP draws a lot of knowledge from the WANO sources and the power plant itself has started providing information to the WANO network since 2004.

Basic system standards establishing principles for safe and reliable operation control are the Operation Control and Procedures and the Production Equipment Operation and Monitoring.

The Operations Control Rules are formulated in accordance with the ČEZ, a. s. strategy so that their observance shall ensure safe, reliable and economic and environmentally friendly operation of the nuclear installation, in compliance with:

- conditions of the SÚJB authorization;
- provisions of the binding legal decrees of the Czech Republic (acts and their implementing decrees);
- operating procedures.

Operation of the Dukovany NPP as well as of the Temelín NPP is managed by the Operations Control Department. The division of responsibilities for the individual activities is defined in the corresponding quality assurance programs.

Special emphasis is put on preparedness and qualification of operating personnel, especially so-called "selected personnel", i.e. personnel who have an immediate effect on nuclear safety (see chapter 6). Also other operating personnel undergo selection, training and hands-on training for the relevant function.

Shift operation in the Dukovany NPP as well as in the Temelín NPP is ensured by six, or seven (for selected professions), equally competent shifts providing for the operation as well as for periodic training and proper rest of the personnel.

Within all unit modes both NPPs use the PSA risk monitor application for monitoring the unit operation risk. Data about unavailability of equipment is analyzed for the reasons of tests, maintenance, and failures in all NPD units. The analyses result in measures leading to the minimization of the operational risk.

When planning the equipment tests and maintenance, the outputs of the risk monitor are used to eliminate combinations of equipment unavailability, which are allowed by Limits and Conditions, but could increase the operational risk in the NPPs.

Organization and activities during annual outages

Preparation and progress of the outage in the Dukovany NPP or the Temelín NPP is controlled by a group of personnel nominated by the Coordination Department manager in the following composition:

- outage manager
- primary circuit working group head
- secondary circuit working group head

- electro working group head
- measurement and control working group head

Shift maintenance dispatcher, who controls and checks the work in accordance with the approved specification for afternoon and night shifts and for holidays, cooperates closely with this group of outage management. In the Temelín NPP the function of the shift maintenance dispatcher is carried out by the reactor unit manager.

Each working group meets on a regular basis on working days for consultation meetings, where its members inform on the current state of the monitored activities, and where tasks directed to the fulfillment of the plan of works are assigned.

After the consultation meetings, consultation meeting of the outage control axis is held, on which, additionally to the heads of the working groups, the reactor unit manager, shift maintenance dispatcher and nuclear safety representative are present. During this meeting tasks for the next 24 (or for 72) hours are assigned. Orders for the shift personnel are also consulted here, which are concentrated into an official document, named Daily Operational Schedule, which is being issued daily.

Fulfillment of the assigned tasks is then checked and evaluated during the consultation meeting of the shift maintenance dispatcher in presence of the outage manager, the heads of the working groups, coordination and representatives of the administration of property, which is held the following day at the beginning of the morning shift.

During the occurrence of non-standard states, which could jeopardize the scheduled progress of the outage, the outage manager calls together the Control Staff, which adopts, after having evaluated the event, measures for the correction of the state.

Preparation of the outage begins six months prior the scheduled date of its beginning, in accordance with the yearly outages scheduled. The yearly schedule is linked to the long-term plan of plant outages, where also the presumed duration of the outage is given based on the standard whilst taking into account long-term extensive activities.

- Basic framework of the main activities is determined based on regular periodic checks of the main components of the unit.
- Important scheduled reconstruction and modifications are included.
- Preparation of complex activities, such as special inspections, plant modifications, may be in progress even several years prior the corresponding outage.
- Six months prior the corresponding outage, fulfillment check of the conclusions and measures from the preceding outage is performed.
- Six months prior the outage, regular Coordination Consultation meetings are started.
- Requirements for execution are further detailed, simultaneously preparation of activities from the viewpoint of material assurance, documentation, selection of the contractor, approval by the regulatory body, etc. is in progress.
- Two months prior the outage the Coordination Department issues the official schedule of the outage, created using the network planning method. The schedule includes decisive activities, which will be performed during the outage. The schedule includes revisions of the main components of the unit, important modifications of the equipment, order of the revisions of the individual electrical systems, availability of the safety systems and also includes logic links of the individual activities. The schedule includes already the sequence of important unit tests during the unit start-up. In the schedule the so-called critical path of the outage activities is marked. The outage schedule is assessed, from the

viewpoint of reactor core damage risk, using the probabilistic calculation and it is optimized for the decrease of risk to be as low as achievable.

- Two months prior to the outage, preparation of the work orders for scheduled outage activities is finished and work starts on grouping these orders into the securing ones and the safety related ones.
- One month prior the outage, a list of modifications and technical solutions, which will be carried out during the outage, is submitted to the SÚJB.
- One week prior the outage a document is issued (operative program), describing in detail activities, which will be carried out in the frame of the unit outage. The document includes also the time schedule. A similar document is elaborated also for activities during the unit start-up after the outage.
- Approximately two days prior the reactor start-up an expert commission meets to judge, based on a report on the performed operational checks, whether the reactor and the pertinent equipment is ready for the restart.
- Subsequently an application for the authorization of the reactor restart is sent to the regulatory body (SÚJB).
- Within one month after putting the reactor into operation a report on the performed repairs on the classified equipment is submitted to an independent supervision body (ITI).
- Within two months after the outage, a summary report on the outage including recommendations and measures for later outages is elaborated.

The outage structure is governed by the following philosophy:

- One critical path is clearly defined.
- During the outage systems and components will be put out of operation and lock once only.
- During the outage the Shutdown PSA (core damage frequency) recommendations are taken into account.
- Systems and components with finished maintenance are tested in accordance with the approved procedure. These tests are performed by the Operations Control Department prior to place them into normal operation.
- Progress of works being in the critical path and in its vicinity is monitored in detail.
- Information on the overall progress of the outage belongs to the information frame being daily submitted to the outage coordination group.

Maintenance

The mission of the maintenance in the Dukovany NPP as well as in the Temelín NPP is to provide and controls all 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 control documents,

and the following is assured:

- nuclear, radiation and conventional safety,
- required reliability,
- design lifetime,
- Limits and Conditions for safe operation,

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

The main goal of maintenance is to ensure the required availability of the nuclear power plant

technological equipment, timely removal of defects, their documenting and performance of monitoring.

The equipment maintenance is carried out in accordance with the elaborated maintenance program for individual equipment including also the preventive maintenance program. The maintenance method and scope depend on the required safety and reliability of the equipment.

The maintenance on equipment of all units in both NPPs is planned materially and financially for a long-term period (5 years), and daily (daily maintenance plan). The maintenance is primarily ensured on a supply basis.

Inspections and tests

During the operation of the units and during regular refueling outages, the Dukovany NPP operating personnel perform regular tests of the equipment. Extent of the tests and their periodicity is given by the Limits and Conditions for safe operation and the Operating Procedures. Based on the requirements given by these documents annual time schedules of the tests are elaborated. For each test methods procedures are prepared, upon which the operating personnel act during the test. According to the test character, these tests are carried out either by qualified plant personnel or by qualified personnel of a supplier in cooperation with the corresponding experts from the plant. Each performed test is documented by a protocol or record.

Possibly identified deficiencies are eliminated, depending on their character and significance, in accordance with a system, described in the internal decrees of the plant. Those are formulated so that the 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 responsible managers.

Independent monitoring and evaluation of tests and inspections

Fulfillment and observance of requirements prescribed in the document Limits and Conditions approved by SÚJB has in the Temelín NPP one of the highest priorities when assuring safe operation and is also the precondition for the fulfillment of safety analyses prerequisites. Limits and Conditions define the conditions for the operation of the unit, under which safety of the operation is proven. In the Temelín NPP systems are established for performance of checks in accordance with the Limits and Conditions, as well as for independent monitoring and evaluation of the correctness, effectiveness, and completeness of other documents and activities, susceptible to influence the fulfillment of the Limits and Conditions.

Requirement for the performance of internal independent checks of the limits and conditions observance is anchored in the Limits and Conditions document. Performance of equipment checks beyond the scope of requirements for inspection resulting from the Limits and Conditions is described in the Operating Procedures. These inspections are carried out by the guarantee for individual systems and all responsible plant departments are acquainted with their results by protocol.

14.1.4 Intervention procedures for the anticipated operational events and accidents

Procedures for activities carried out by the shift personnel and the unit main control room personnel are established in the Operating Procedures. All NPP operating documentation underwent an extensive reworking. Operating Procedures are divided into two parts: operating parts - used by operators in the process control, and descriptive part - 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 for both NPPs. Databases of signals, protections and blocks, valves, drives, etc. are being loaded in accordance 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 nuclear power plant extensive modernization.

For case of abnormal states occurrence the relevant procedures (AOP) are elaborated in both NPPs.

For the support of the MCR operational personnel during the control of situations under emergency conditions, symptom-oriented Emergency Operating Procedures (EOPs) were prepared. Either the reactor scram or start of the safety systems is an initiation event for the start of the activities in accordance with these procedures.

These symptom-oriented Emergency Operating Procedures were evaluated in accordance with the methodology and in cooperation with the Westinghouse Company.

The package of the strategies includes a wide range of events within the emergency conditions – ranging from design basis accidents to possible combinations of events, including multiple breaks and equipment failures. Emergency Procedures include in accordance with the level 1 PSA study, all relevant scenarios, which might lead to the core damage. The MCR operative personnel interventions are always in accordance with the requirements for the minimization of consequences of a possible radioactivity release into the environment.

The Emergency Operating Procedures deal with extraordinary conditions of the NPP according to their symptoms, i.e. independently on events. Monitoring of the critical safety functions is an integral part of the procedures. All extraordinary states are always resolved till the so-called safe condition. This means into that condition when a nuclear unit is fully under the operator's control, and is mostly cooled down to the primary circuit temperature less than 100°C in accordance with the Operating Procedure.

The Procedure was developed by experts with many years of operating practice. Individual stages of the new operational Procedure development were subjected to verification by both Westinghouse and units main control rooms personnel. A study of the human factor response in the application of the Procedure has been performed. The emergency procedures were validated on the simulator.

The Emergency Operating Procedures (EOPs) are currently updated on regular basis using changes in design, comments arising during simulator training and especially comments arising from the long-term Westinghouse contract (the so-called "Maintenance program"). Annual meetings of the Procedure authors and Westinghouse employees are held to discuss significant comments and proposals from the NPP side and, at the same time, the Westinghouse Company discusses with the NPP personnel approved changes in generic instructions. Approved changes are after validation included into the Emergency Procedures. Extensive causative documentation, the so-called "Basis", forms an integral part of the Emergency Procedures.

The Emergency Procedures are 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, including their changes.

The procedure for fault condition solutions (Shutdown EOPs) was created for non-power reactor modes for the Dukovany NPP in cooperation with the Westinghouse Company.

Similar procedure has been created for the Temelín NPP. The PSA results for non-power conditions (Shutdown PSA) were used as background material for the creation of this Procedure. The Procedure amends the EOPs so that all operating modes, including outage and refueling are covered.

In cooperation with the Westinghouse Company guidelines were created for the Dukovany NPP for the resolution of severe accidents (Severe Accident Management Guidelines - SAMGs). The guidelines are linked to EOPs. Similarly the SAMGs procedures for the Temelín NPP were created in cooperation with the Westinghouse Company. The procedures are created in particular to support the decision-making process of the Technical Support Center (TPS) and the Emergency Headquarters (HŠ). Full implementation of the procedures in both NPPs is supposed to be ready in the course of 2004.

All above given procedures (AOPs, EOPs, Shutdown EOPs and SAMGs) are created in the framework of one philosophy. The procedures are described in the same form and provide for defense-in-depth in the second through fourth level in accordance with the INSAG 10 document issued by the IAEA. In the present time new versions of all relevant procedures, including changes caused by the I&C system restoration are being created.

14.1.5 Engineering and technical support

Within the ČEZ, a. s.- NPD Engineering Department organizational structure the Design Administration section is integrated, which performs and coordinates the activities of the engineering and technical support. This section has a common competence for both Czech nuclear power plants. Section responsibility and rights are clearly established in the ČEZ, a. s.- NPD control documents (field of T02 activities).

Main objectives of this section in the field of design administration are as follows:

- control of the Design Basis collection and update process and its utilization in the performance of equipment configuration changes (Design Basis),
- update of selected License Basis documents,
- equipment qualification process control,
- preparation of long-term operation of the Dukovany NPP and Temelín NPP beyond the design lifetime (PLEX/LTO),
- assurance of technical part as to nuclear-power installation decommissioning,
- utilization of national as well as international technical supporting programs.

Main objectives of this section in the field of equipment configuration changes control are as follows:

1. In the phase of pre-designing stage:

- Acceptance and assessment of requirements (Technical Initiations) of the equipment administration departments, operational departments and other NPD departments of both power plants for the equipment configuration changes.
- Elaboration of conceptual design assignment for given required and relevant changes in the equipment configuration (Technical Assignment).
- Complex assessment of technical, operational and safety aspects of prepared change in the equipment configuration, including fulfillment of legislative requirements to the state authorities.

2. In the phase of design preparation and implementation:

- Check of design documentation of the equipment configuration changes from the viewpoint of observance of a conceptual technical assignment, which placed this change into the designing stage.
- Technical support during implementation (installation) of the equipment configuration changes and during verification of modified design functions affected by these changes (PKV).
- Elaboration of technical part of evaluation of the technical economic benefit of implemented equipment configuration changes.

Performance of technical and engineering support is controlled by the advisory body of the ČEZ, a. s.- NPD Engineering Department manager – the Evaluative Technical Committee (HTK).

Within the Engineering department the Modifications Preparation and Implementation section is integrated, which ensures technical and commercial preparation of the designs as well as implementation of the equipment or system modifications, so that the equipment administration departments, or the operational departments are entrusted with the charge of modified and tested equipment through the "turnkey" system, including delivery of required documentation. The Design Administration section and the Modifications Preparation and Implementation section cooperate even in evaluating technical and economic benefit of each modification of the equipment and system. Technical development tasks are from the viewpoint of strategic objectives of the ČEZ, a. s. assessed and controlled by the department 4100 of the ČEZ, a. s. Headquarters.

Technical and engineering support is provided by highly educated personnel, qualified for specific tasks they perform themselves, or which are performed under their supervision. Close working relationships exist between the Design Administration section and the operational departments of both power plants, which are again formally defined in the ČEZ, a. s.- NPD control documents. When performing the technical and engineering support the ČEZ, a. s.- NPD closely cooperates with the general designer of both Czech nuclear power plants, the ÚJV a. s. - EGP Praha Division, as well as with the Russian design organizations, which are authors of the original type designs of the VVER nuclear units. Further cooperation is continuously in progress with qualified research and scientific organizations and universities, as well as with suppliers and designers of implementing designs of individual systems of nuclear units of both plants.

Restoration of safety systems I&C system and the unit information system in the Dukovany NPP is provided within the organizational structure of the ČEZ, a. s.- NPD Engineering department by the I&C system Restoration section in the Dukovany NPP, which controls this extensive action. The section provides and controls all technical and investment activities related to this action, while closely cooperates in the technical field with the Design Administration section.

14.1.6 Operational events experience exploiting in ČEZ a. s. NPPs

The ČEZ, a. s. nuclear power plants apply the system permitting to benefit from their own operating experience – the Dukovany NPP since the beginning of its commercial operation in 1985, and the Temelín NPP in the course of its constructions and commissioning. At the same time also experience from international nuclear power plants, obtained from the WANO network, is used in the NPP. The whole process, which includes examination of the operational event causes, remedial measures and feedback of experience from these events, is ensured by specific departments in the relevant NPP and is described in relevant control documentation in individual NPPs.

For the purpose of unified legislation within the NPD the control documentation is currently being unified in the individual NPPs to the maximum possible extent limited by the design differences of the individual NPPs.

The process covers methods for gathering information on operational events, their registration, investigation procedure, and analysis of their causes, establishment and adoption of remedial measures for these events, monitoring of their implementation and evaluation of operational events feedback effectiveness and trends. The process also includes obligation and procedure for the transfer of own experience to other NPPs operators and for the dissemination of foreign and own operational experience within the plant.
In the given documentation, criteria are also given for recording the events; for safety related events the documentation also provides criteria in accordance with which selected events are reported to the SÚJB or other relevant bodies or organizations (ČEZ, a. s. Headquarters, Hygiene Service, Fire Brigade, etc.).

The events are evaluated according to the INES international scale for evaluation of event significance in the nuclear installations. 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 events investigation in the power plant, but also other further plant specialists from special departments are involved in the process.

Part of the above activities is supporting personnel honesty and effort to consistently investigate all events, which may jeopardize safe and reliable operation. The principle is that the admission of own mistake is an acceptable impetus to improvement of the safety culture, whilst the priority is not to find the guilty parties, but to improve the condition.

For regular evaluation of effectiveness of experience from own operational events, the main criterion is the event non-recurrence for the same causes. Repeated events or problems are regularly evaluated in the ČEZ, a. s. NPPs in quarterly or annual reports on the operational events and possible further measures are proposed. For tracking problematic areas – trends, precursors – the coding of events causes is used. This is elaborated once per two years as Appendix to the annual report "Feedback from internal events".

Three types of events are distinguished in the monitoring system (process):

1) Events important from the nuclear safety viewpoint. These events must be discussed by the Failure Commission of the relevant NPP and the causes together with the adopted corrective measures are regularly checked out by the SÚJB.
2) Minor (less significant) events (INES classification always less than 0, they are classified out of scale). These events are investigated within the work order of the corresponding departments; these events are not discussed by the Failure Commission; corrective measures are checked by the feedback department.
3) Events without consequences ("near misses"). These events are treated in the same way as the events in the preceding paragraph. Their possible influence on any process in the plant is being evaluated.

The Events Investigation Commission (Failure Commission), which is established as the advisory team of the top NPP management for identification of causes, corrective measures and conclusions for the events investigation in individual power plants, confirms at its regular meetings the completeness of the investigations of safety related events causes and adopts corrective measures for the elimination of their causes for the purpose of prevention of their repeating.

Significant events are also discussed by Technical and Safety Commission in the presence of

the plant top management. The corrective measures are filed in a special program, and their state and method of their fulfillment is regularly checked.

NPPs dispose of the relevant software being part of the plant computer network, which allows recording and processing of characteristic data of that event resulting after completion of the process of investigation. This makes all important data and experience available to other NPP personnel to be used for the improvement of the plant operation reliability.

Selected events having occurred in the plant or abroad are included in the training of the plant personnel and management.

SÚJB participates in the supervision of this process in accordance with the law.

External events

ČEZ, a. s. NPPs are actively involved in the international organization of nuclear power plant operators. This allows active and effective mutual cooperation with other NPP operators in operational experience exchange. Analysis and utilization of operational experience and technical information from other operated nuclear power plants conduce to improvement of the NPP operation safety and reliability. When sharing own operational experience the ČEZ, a. s. NPPs conduce to effective application of this process within the international context.
The above given system of taking profit from the events in other nuclear installations on worldwide basis is incorporated into the event investigation process. The main objective of the system is to transfer and to utilize any operating experience and technical information acquired by nuclear power plant operators in the ČEZ, a. s. NPPs practice. The system is described in a special instruction and comprises five basic programs:

- operational events reports,
- direct information exchange between the operators,
- operational indicators WANO, PRIS,
- good practice,
- partner inspections.

Information selected from WANO, INPO, IAEA and NEA sources is included into agenda of the Events Investigation Committee. All obtained information is archived in form of a database, and used by the plant experts as technical support in resolving plant's problems.

14.1.7 Notification of events important for nuclear safety

One of the basic legal obligations of the nuclear installation operator is to immediately notify safety related events to the Regulatory Body. Transferred reports cover the solution of events and non-nominal states, in relation to nuclear safety, radiation and physical protection, emergency preparedness and nuclear materials management, as well as all other activities and changes affecting nuclear safety and radiation protection.

Extent and methods for transfer of information on selected events in respect of nuclear power plants operation safety, are established by the common Agreement between ČEZ, a. s. and SÚJB. The reporting procedures are described in the plant internal documents. The Regulatory Body is regularly informed on the operational state of all reactor units through a daily report, which is always mutually consulted and amended by verbal commentary on other current information from the morning operative session of the shift engineer. The inspectors are acquainted with other scheduled activities for the nearest period through a valid daily operation plan.

For the operative communication (provable immediate transfer of information) both NPPs established a special log of operative contact between the operator and local safety inspectors.

14.1.8 Optimization of nuclear installation operational radioactive waste production

Basic objective

Radioactive wastes from normal operation of both NPPs, with exception of highly active wastes (spent fuel, components of reactor internals), stored, after the appropriate treatment, within the Dukovany Radioactive Waste Storage Facility. With respect to ecological and economic conditions of the NPPs, radioactive waste storage in this storage facility represents an optimal option fulfilling 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 conditioned by processing the radioactive wastes into a form suitable for storage.

Liquid radioactive waste are temporarily stored as radioactive concentrate after sedimentation and concentrating. Subsequently, they are processed in a bitumen product. Operation of the bitumenation line is organized so that the permitted volume of stored concentrates is not exceeded, and at the same time there is sufficient free volume for sewerage waters from the units operation. In the Temelín NPP this means processing of the whole volume of sewerage waters in several campaigns in the course of the year. In the Dukovany NPP the capacity of the technological equipment allows processing of concentrates with the volume higher than the volumes of new sewerage waters, and thus the quantity of stored concentrates permanently decreases.

Solid radioactive waste are systematically sorted and measured. Part of the wastes, which fulfils the strict criteria, is released, under strict control, into the environment. Remaining wastes are processed and stored. For the final treatment of compressible wastes the high-pressure compressing is to be used approximately over a period of 10 years.

Radioactive sediments and adulterated sorbents are stored in the storage tanks. Currently the verification of technologies for treatment of these wastes is in progress.

Minimization principle

The basic requirement during radioactive waste management is the minimization of their amount. This process includes avoidance of the waste occurrence, modification of technological equipment, operating procedure modifications and optimization of processes during the waste treatment and processing. Minimization is understood as a complex process with direct impacts both in environmental and economic indicators of the NPP operator.

At NPP, the following measures are continuously implemented aimed at reducing the radioactive waste generation:

- development and implementation of low-waste decontamination technologies,
- separation of non-active sediments from the exchanger cleaning,
- restriction of objects brought into the controlled area,
- limiting entries of persons into the controlled area,
- optimization of protective plastic sheets usage,
- replacement of service water with condensate or demineralized water in points, where leakage occur (reduction of salts amount in radioactive concentrates).

14.2 Statement on the implementation of the obligations concerning Article 19 of the Convention

The above text proves that the legislative requirements imposed on the commissioning of a nuclear installation, its operation and performance of the proper activities are conform, in the Czech Republic, to the requirements of Article 19 of the Convention.