Report on SÚJB Results Achieved in the Surveillance of Nuclear Facility Safety and Radiation Protection for 2002

Contents

INTRODUCTION

The year of 2003, whose beginning found us reviewing our hitherto results, is important for the State Office for Nuclear Safety (hereinafter as SÚJB or Office) on two counts: our tenth birthday in January was an occassion to remember the period as a time of the determined and difficult effort of guarding nuclear safety and radiation protection in our country. The year will also witness the completion of the start-up process of Temelín NPP; both units of the plant are to start operating at full power and a period of power start-up will enter into a period of routine operation. At a cursory glance these events are not directly linked - but their hidden inherent relation runs deep.

An Act of Lawwhich came into effect on 1 January 1993 made SÚJB an independent body of the state administration acting as the principle Czech watchdog in nuclear surveillance. The Office seeks to bring the peaceful exploitation of nuclear energy and ionizing radiation in line with the requirements for nuclear safety, health protection and environmental preservation. Although the Office is a solely administrative and monitoring agency, by no means involved in formulating the state energy policy and fully decoupled from the issues of the energy market and from the development of nuclear technologies (the nuclear power industry included), it pays close heed to these matters in an effort to enhance nuclear safety and radiation protection in general.

Our staple effort, i.e. inspection activities, has been pursued parallel to a range of other jobs entailed by the official establishment of the agency: all sorts of the material and legal aspects of our operation had to be taken care of, new nuclear-related legislation had to be enacted, and last but not least our authority in monitoring radiation protection measures and in keeping an eye on the adherence to the international ban on nuclear, biological, chemical (NBC) & toxin weaponry had to be substantially enhanced.

We had to perform a qualified inspection of the construction, start-up and operation of the undoubtedly largest, most complex and probably the most widely discussed engineering project of the past century - the Temelín Nuclear Power Plant. All the above stages of the undertaking had to be closely scrutinized for compliance with rules of nuclear safety and radiation protection so that the Plant could meet the internationally recognized safety recommendations and become a reliable, safe, and popularly accepted source of electricity. The same was true, of course, for the Dukovany NPP, a plant about to celebrate twenty years of reliable operation with an impeccable record of nuclear safety, featuring parameters highly appreciated by the global nuclear community.

The results of SÚJB´s own inspections and reviews allow us to confidently state that in 2002 all requirements decisive for nuclear safety and radiation protection were met, as the law demanded, in all nuclear facilities and premises around the Czech Republic where sources of ionizing radiation were used. No nuclear or radiation related facility experienced any serious failure causing a leak of radioactivity into the environment, nor was there an above-the-limit radiation threat to workers or to inhabitants living close to such facilities.

The key factor impacting the use of nuclear energy is invariably a duly qualified operator. In the Czech Republic the sole entity certified to build and operate nuclear power plants is ČEZ a.s., a company subject to an unceasing process of examination and evaluation by state surveillance agencies. SÚJB monitors the major safety related areas in the four units of Dukovany NPP and two units of the Temelín

Plant; as of now (late February 2003) the first of the two Temelín units is at the stage of trial operation and initial overall refuelling accompanied by the related checks and maintenance. The second unit is going through the final stage of full-power start-up as the approved plan of testing requires.

The Office´s surveillance effort on the Temelín plant throughout the evaluated period featured special gravity and intensity, and most importantly we have learnt many lessons, as usual. The Temelín plant offered new testing-related problems not encountered before. Regarding nuclear safety the problems caused by the Plant's conceptual and design solutions, implemented particularly in the secondary circuit, have been successfully tackled. When there were any transients and unexpected events, they were reliably managed by the automated control & safety systems, as envisaged in the design documentation. Also the break-in periods of the turbogenerator sets at both units experienced some difficulties of a purely engineering nature, not directly related to nuclear safety, nevertheless they attracted a good deal of media attention and the lengths of downtimes necessitated by the set unavailability were certainly rather unpleasant for the License Holder. Still, SÚJB appreciated that the occurences did not encroach upon nuclear safety.

At first glance we could easily gather the impression that the attention paid to our two major nuclear facilites rather marginalizes the other SÚJB's activities. By no means. Particularly in the area of radiation protection - both institution-related and personal - the past five years witnessed sweeping changes. Relevant legislation was amended and completed. The entire system of overseeing how requirements for radiation protection are met have been modified and revamped to become a unified body able to systematically and almost immediately deliver any information on management and surveillance from a full range of premises using sources of ionizing radiation - in fact anything from large nuclear facilities to premises handling open radionuclide sources to dental X-ray devices, including processes of type approval of ionizing radiation sources; the treatment of radioactive waste and the penetration of radionuclides to the environment; monitoring, assessment, and management of personal irradiation doses; and the irradiation inflicted by radon and other natural sources of radioactivity, including doses absorbed during accidents. The country-wide Radiation Monitoring Network is coordinated as a single structure and linked to international systems so that radiation related data can be freely exchanged. There was also a Registry of Ionizing Radiation Sources and a Record of Occupational Doses established, both acting country-wide. The SÚJB results indicate no release of radionuclides into the environment in excess of the SÚJB authorized limit, not even during the major flood affecting large areas of the Czech Republic. Moreover, the scrutinized facilities & premises with sources of ionizing radiation have managed to keep their sources in check.

Similar results have been achieved in the newly unfolding area of surveillance and inspection activities aimed at monitoring the discharge of obligations laid out in the treaties banning nuclear, chemical, biological and toxin weapons. It is one of the paradoxes symptomatic of the period that the effort of SÚJB, SÚJCHBO and SÚRO staff spent in the field of anthrax issues; at the IMF sessions; at the NATO Summit; and in helping to remedy the flood aftermath, are better known than their activities entailed by everyday operations. But this is also an aspect illustrative of our job.

The period being assessed saw a continuation of the broad process of bilateral and multilateral international cooperation embracing, as before, the assessment of the Temelín and Dukovany plants. When compared to the previous years, the positions of the cooperating agencies, particularly that of MAAE, have not

shifted. All international organizations taking part in the assessment process focused on the Czech nuclear power plants agree that SÚJB meets its obligations as they follow from negotiations on these issues, especially those held on the EU platform, and thus the Office enhances the confidence in the adequacy of Czech nuclear safety precautions and radiation protection measures.

The national and international assessment and inspection activities have yielded a number of findings and recommendations for the long-term planning and formulation of concepts aimed to boost the nuclear safety and provide for radiation protection (both on the License Holder side and on the surveillance agency side). As regards the License Holder's attitude towards the observance of these recommendations, the Office can express satisfaction. Both the nuclear power plants continuously improve their operational and safety indicators and dedicate human and financial resources to raise the level of nuclear safety and radiation protection of their equipment and personnel. Particularly in consideration of the latter aspects SÚJB monitors the organization changes implemented in ČEZ, a.s. NPPs so that the Office can, in good time, reveal the adverse impacts that deregulation of the electric energy market may have (as generally known).

The Office has completed another year of exacting and often very difficult outward-oriented communication, both nationally and internationally. We have never overestimated our potential and capabilities in this area. Still we are convinced that, especially at the international sessions held within the Melk process and during the follow-up accession negotiation on the Temelín plant, the Office has helped to reach the successful result finalized in December 2002 in Copenhagen. We believe that the Office has provided both the domestic and the international public with information sufficient to dissipate the fear and myths spread from ill-informed and often outright anti-nuclear sources. Critically-minded people capable of factual and constructive dialogue will, even in the future, find us attentive partners ready to accept their substantiated comments and use the comments as a basis for specific and practical conclusions. However, our ten years of experience in the field strengthen our resolve for the future to offer an active resistance to malice, evil intentions, lies and half-lies, and biased "facts".

The volume of work SÚJB has managed throughout the past ten years is enormous. Not always did we perform as intended, not always was the result perfect. Still we believe that the Office has done a good job beneficial for the entire country. SÚJB has maintained its previous independence and in fact, enhanced it - not just the technical independence, which comes as a matter of fact, but also financial and legal independence (as related to the State Administration and the Government); now we have an important say in legislation being newly enacted, and our decisions and administrative acts are subject to scrutiny by noone else but an independent court of law. The Office has acquired a strong position internationaly, despite the diversity of the current world with all its communication crossroads and interfaces. At present, SÚJB is respected more than ever in the history of state surveillance of nuclear safety and radiation protection, which is true of not only the Czech Republic, but also of the entire territory of what used to be Czechoslovakia. The Office has all prerequisites needed for tackling its tasks and (which is of particular importance) all rights & authorities required to effectively defy any direct or mediated pressures exerted by political, economic or other interest groups.

We do not perceive the decade just finished of exacting and even creative SÚJB work as a reason for self-complacency. Quite the contrary, we see it as a challenge and an opportunity to analyze our hitherto activities and an inspiration for

further steps designed to gradually and consistently enhance nuclear safety and radiation protection, to optimize the inspection procedures aimed at securing the nuclear, biological and chemical protection and at meeting our contractual obligations towards our partners abroad.

Ing. Dana Drábová
SÚJB Chairperson

1. State Office for Nuclear Safety

The State Office for Nuclear Safety (hereinafter SÚJB or Office) is a central state administration agency independently budgeted and headed by a chairperson appointed by the government of the Czech Republic.

SÚJB performs state-governed administration and surveillance of the use of nuclear power and ionizing radiation and covers the area of radiation protection. The Office's sphere of authority, granted by Act 18/1997 Coll., on the peaceful exploitation of nuclear energy and ionizing radiation (aka Atomic Act), encompasses particularly:

- Performing state-governed surveillance of nuclear safety, nuclear items, engineered safety features employed to ensure the physical protection of nuclear facilities, radiation protection and emergency preparedness within nuclear facilities and premises using sources of ionizing radiation.
- Licensing activities conducted pursuant to Act 18/1997 Coll., such as locating and operating nuclear facilities and premises using major sources of ionizing radiation; handling ionizing radiation sources and radwaste; shipping nuclear materials and radionuclide radiation sources.
- Approving nuclear and radiation protection related documentation as stipulated in the Atomic Act; of the Limits & Conditions included in Technical Specifications; of the methods of engineered safety features implementation; of emergency rules used to govern the transportation of nuclear materials and some selected radionuclide radiation sources; of in-house emergency plans for nuclear facilities and premises with sources of ionizing radiation.
- Determining the conditions and requirements for the public protection from radiation as well as the workers engaged in jobs involving sources of ionizing radiation (e.g. the stipulation of exposure limits, the delineation of a controlled area); defining the Emergency Planning Area and the requirements for emergency preparedness of the License Holders as set forth in the Atomic Act.
- Monitoring the exposure of the public and workers handling sources of ionizing radiation.
- Coordinating the activities of the Radiation Monitoring Network within the Czech Republic and taking care of the international exchange of data on radiation situation.
- Operating the system of State Registry and Inspection of Nuclear Materials and maintaining the State Registry of License Holders; of some selected imported and exported items; of sources of ionizing radiation; and keeping track of the exposure of the public and workers handling ionizing radiation sources.
- Providing technical cooperation to the International Atomic Energy Agency (IAEA).
- Supplying community authorities and regional municipalities with data on radwaste management as related to the territories they administer; delivering relevant information on the Office's activities and their results to the public and the Czech Government.
- Disseminating information on measurements and reviews of the effects that the nuclear, chemical and biological substances may have on humans, including the appraisal of the level of protection from such substances that individual and collective protective means offer to humans.
- Coordinating and organizing efforts aimed to deal with tasks following from the Convection on Banning Development, Production, Stockpiling and Use of Chemical Warfare and on Its Disposal as envisaged in Act 19/1997 Coll.

To suit the SÚJB's purposes and to facilitate its duties, the Office's structure has been designed thusly:

Nuclear Safety Division
comprises the Nuclear Facility Assessment Department, Nuclear Facility Inspection Department, and the Nuclear Materials Department.

Radiation Protection Division
comprises the Sources & Nuclear Power Engineering Department, Exposure Management Department, Environment & Radwaste Department, and an independent License Department.

Management & Engineering Support Division
comprises the International Cooperation Department, Economic Department and the Office Secretariat. The Division also embraces the National Authority for Monitoring the Ban on Chemical Warfare.

The Office's chairperson is vested with the direct authority over the Emergency Preparedness Department (the Department also acts as a Crisis Coordination Center and coordinates the Czech Radiation Monitoring Network), the Quality Manager Department and the Defense & Inspection Department.

SÚJB has established Regional Centers (RCs) in Prague, Pilsen, České Budějovice, Ústí nad Labem, Hradec Králové, Brno, and Ostrava, plus two detached sites at the Dukovany and the Temelín NPPs.

SÚJB controls a budgetary organization, namely the State Institute for Radiation Protection (SÚRO), and a contributory organization, namely the State Institute for Nuclear, Chemical and Biological Protection (SÚJCHBO) based in Příbram - Kamenná.

Throughout 2002 the SÚJB's operation and management was governed by Act 490/2001 Coll., dated 18/12/2001, on the Czech State Budget for 2002, as enacted by the Chamber of Deputies of the Czech Parliament. To use its competencies and to fulfil its duties between 1999 and 2002, the Office was assigned the following capital and workforce:

Selected expenditures spent from Budget Chapter 375 - SÚJB (in "000" CZK)
Table 1.1

YEAR	1999	2000	2001	2002
Overall running expenses	175 548	215 158	237 573	249 097
itemized:				
water, fuel, energy	4 134	4 859	6 033	6 605
services	48 197	56 503	52 508	55 918
science and research	17 227	26 449	37 449	42 414
Overall capital expenditures	31 998	29 169	50 805	93 012
itemized:				

tangible assets	28 067	4 560	41 622	84 582
intangible assets	3 648	23 891	3 048	3 720

Workforce development - SÚJB (state administration)
Table 1.2

Indicator	Category	1999	2000	2001	2002
Planned workforce	Expected figure (persons)	160	178	190	193
Real workforce (as registered)	Actual figure (persons)	156	184	187	192

The increase in the 2002 expenses & expenditures was generated by the expansion of SÚJB's scope of activities, particularly in the area of nuclear, chemical and biological protection; the rise was driven mainly by the capital expenditures spent primarily on materials, instrumentation, and equipment needed for inspection jobs. The staff increase trend has stopped growing and tends to stabilize, despite a number of tasks the Office had to tackle in preparation of the Czech accession to EU and in response to some newly emerging requirements.

2. State surveillance of nuclear safety

2.1 Dukovany Nuclear Power Plant

2.1.1 Dukovany NPP operation

In 2002 the Dukovany NPP (EDU) experienced no event resulting in an impermissible release of radioactive substance into the environment. SÚJB has appraised the operation of all units as safe and reliable. Out of the 14 operational anomalies on record, 12 were evaluated as level "0" on the eight-level IAEA INES international scale. These events, typical in keeping within the operational Limits & Conditions, impinged on nuclear safety in a minor, i.e. low-significance way, and were safely coped with using common operational procedures. Two of the events were evaluated as INES level "1" (for details see the following section "Operation Anomalies").

All four Dukovany NPP units were operated in the baseload mode as required by the Power Control Center. The operation history of the individual units is depicted on the histograms in Annex 3 hereto. In 2002 three reactor units were treated to a scheduled refueling outage associated with a Type Overhaul, while the 4th unit underwent refueling plus an Extended Overhaul.

2.1.1.1 Operation anomalies

As mentioned above, in 2000 EDU witnessed 14 operation anomalies altogether, including anomalies resulting from the actuation of reactor protective devices. Two of these anomalies have been evaluated as safety significant events of INES level "1". The first anomaly was caused by a cluster of human errors made in an effort to prepare tests of protections and interlocks of the essential service water pumps; the second one was related to manually initiated reactor shutdown using a safety protection pushbutton on Unit 2 in July 2002. This event was also evaluated as a fault caused by personnel.

In July, Unit 2 experienced the activation of the 1st and 2nd stages (HO-1, HO-2) of the reactor scram system (see the Table below). Handling operations (made coincidentally with refueling and aimed to adjust the chemistry between the pressurizer and the primary circuit) induced a pressure drop in the primary circuit; the drop activated HO 3 with a subsequent transition to HO 2. In compliance with the operation documentation the operator shut the reactor down using the HO 1 pushbutton. In conformity to the Limits & Conditions the fault was duly reported to SÚJB and became a subject of investigation by a Special Failure Commission. The Commission's conclusions led to provisions designed to prevent recurrence of the same problem in the start-up stage of the units after refueling. In addition, the Reactor Power Reducing System (HO-3) was activated twice and the Reactor Power Limiting System (HO-4) nine times. The HO-3 Limiting System intervention was experienced not only on Unit 2, but also on Unit 3; it was caused by the actuation of a frequency protection on a 400 kV line of the Unit 3 power output. Consequently, the line was disconnected from the grid. The Limiting System remained activated for 1 second and the Unit power became stable within 1 minute of the event occurrence. The Table below offers a summary view of the situation; the first column is used to

number the failures, the second column contains the dates on which the failures occurred, and the third column states the reactor power at the moment of failure. The fourth column contains a code used to designate the level of the intervening system (be it the Scram System or the Power Limiting System), and the fifth column serves to briefly describe the protection intervention cause.

Table 2.1

1	2	3	4	5
Unit 1				
1	30.3.2002	100%	HO-4	Control rod assembly hit the lower limit position; PNČI substitution
Unit 2				
1	1.6.2002	0%	HO-4	Control rod assembly was inserted into a shut down reactor; "PNČI substitution actuation" - a tripped circuit breaker revealed.
2	8.7.2002	100%	HO-1	Pressure drop in the primary circuit; consequently HO-3 intervened and turned into HO-2; ultimately, shutdown was effected with an emergency pushbutton.
3	13.12.2002	100%	HO-4	Collapse of a control rod assembly; PNČI substitution
Unit 3				
1	3.1.2002	100%	HO-3	400 kV line failure at the Unit 3 power output
2	13.4.2002	0%	HO-4	Upon the generation of shutdown concentration in mode 3 operation, a control rod assembly dropped to the lower limit position.
3	15.9.2002	100%	HO-4	Collapse of a control rod assembly; PNČI substitution
4	30.9.2002	100%	HO-4	Collapse of a control rod assembly; PNČI substitution
Unit 4				
1	22.8.2002	100%	HO-4	Collapse of a control rod assembly; PNČI substitution
2	24.11.2002	100%	HO-4	Collapse of a control rod assembly; PNČI substitution

The automated power limiting and protective reactor systems behaved as envisaged in the design. The limiting system intervened solely when initialized by the PNČI substitution. EDU pays constant attention to the issue of PNČI power supply and seeks long-term solutions to meet the conditions laid down by SÚJB.

2.1.1.2 Adherence to Limits & Conditions

In 2002 the Operator did not ask SÚJB for granting an exemption from the applicable Limits & Conditions (L&P in Czech). The company reported one L&P violation related to the availability of the essential service water and the associated systems. The event was investigated at the session of the EDU Special Failure Commission; the Commission suggested corrective actions aimed to prevent recurrence of such incidents in the future. SÚJB inspectors disclosed no other L&P violation.

2.1.2 SÚJB inspection activities

SÚJB inspection activities performed at EDU in 2002 have been documented in 157 Inspection Reports filed as closed. The inspections (1) followed the approved half-year Inspection Schedules, and (2) were conducted as the actual equipment condition required.

The periodic inspections governed by the "Schedule of Routine Checks" focused on the monitoring of adherence to the limiting and safety parameters. As follows from the inspections, within the period monitored the individual units were operated in conformity to the relevant regulations, and the operation parameters complied with the design envisaged values. The safety limits and setpoints of protective systems corresponded with the Limits & Conditions (L&P) approved in Technical Specifications, and, except for the single case quoted above, the L&Ps were observed throughout the year.

The scheduled inspections systematically monitored the tests conducted to verify the availability of a protective system of the individual units, as well as the automated start-up capability of standby gensets in the system of emergency power supply of on-site consumption (Category 2). The tests were found satisfactory. Moreover, we regularly checked how events significant for nuclear safety and radiation protection were investigated. The corrective actions ordered by the EDU Failure Commission were scrutinized if duly implemented. SÚJB was satisfied that the Failure Commission examined the safety significant events properly, and the deadlines for remedial provisions were met. Here, SÚJB found no graver deficiencies.

SÚJB paid consistent attention to the unit refueling outages, overhauls and repairs; to the units going critical so as to reach *the minimum controlled power after refueling*; as well as to some selected tests of the physical and power start-ups. The individual units were shut down and started up in conformity to the L&Ps and the applicable operation practices.

At the late stages of the outages SÚJB regularly monitored the process system tests, particularly the tests of unit engineered safety features used to govern the actuators, and the tests of the total loss of the unit own power supply. These inspections relied on the prescribed documentation; the criteria required for the "passed" result of the tests were met.

Throughout the *periodic integral tests of tightness* (PERIZ) performed at the late stages of refueling outages our inspections tried to verify that the Limits & Conditions (L&Ps) were met, and the approved methods applied when testing the tightness of spaces required to be hermetic. The inspectors were satisfied that the PERIZ tests were conducted at all units in compliance with L&Ps and the approved methodology, and that the envelope of the hermetic space met the L&P requirements at all units.

SÚJB paid much attention to the checks to be performed before the permission for *reactor power-up to the minimum controlled power after refueling*. The inspections focused primarily on:

- operation checks; on modifications; and on the readiness of machinery for operation after refueling and overhaul. The checks proved that the equipment did not deviate from what was envisaged in the Schedule of Operation Checks; that it did not show any other deficiencies or faults; and that the modifications followed the approved documentation.
- the progress of refueling; on the review of neutron & physical characteristics of units before the next fuel campaign; and on the assessment of the unit start-up program and the physical start-up sequence. The checks demonstrated that the safety requirements were fulfilled and the stipulated procedures applied in all these areas, and that, in view of the neutron & physical parameters, the reactors of the individual units were ready to operate during the next fuel campaign.
- the personnel readiness to put the units to operation after refueling, with a particular emphasis placed on the selected staff of the control rooms;
- the review of checks completed in the sector of electrical power systems and I&C systems;
- the fulfillment of conditions stipulated and decisions made by SÚJB about the operation of the individual units. The SÚJB inspectors were satisfied that the License Holder continually complies with the conditions set forth in the previous Office decisions.

None of the checks revealed deficiencies that would prevent the state surveillance agency from granting an approval to the *reactor power-up to the minimum controlled power after refueling*.

On a continuous basis SÚJB examined the observance of conditions stipulated in the Office's decision of approving modifications to the I&C safety systems. The approved modifications will be implemented in four stages during the relevant unit outages in accordance with the Quality Assurance Program. The check included, among others, an audit of the safety-related documentation and management of modifications impacting the documentation; the effort aimed to assess whether the previous SÚJB requirements for the documentation amendments or changes were fully met. Here, SÚJB has not disclosed any signs of an undesirable development.

2.1.3 Evaluation of inspection activities in the assessed areas

Based on the completed inspections, SÚJB arrived at the following summary evaluations:

Operation

Dukovany NPP's operation has been evaluated as satisfactory, exhibiting an observable improvement over 2001. 2002 witnessed a reduction of events categorized INES 0; conversely, the number of INES 1 events increased from 1 to 2. In a single case L&Ps were violated (see 2.1.1.2). Also the number of reactor power

reductions necessitated by the turbo-generator failures or by inevitable repair activities diminished.

Maintenance

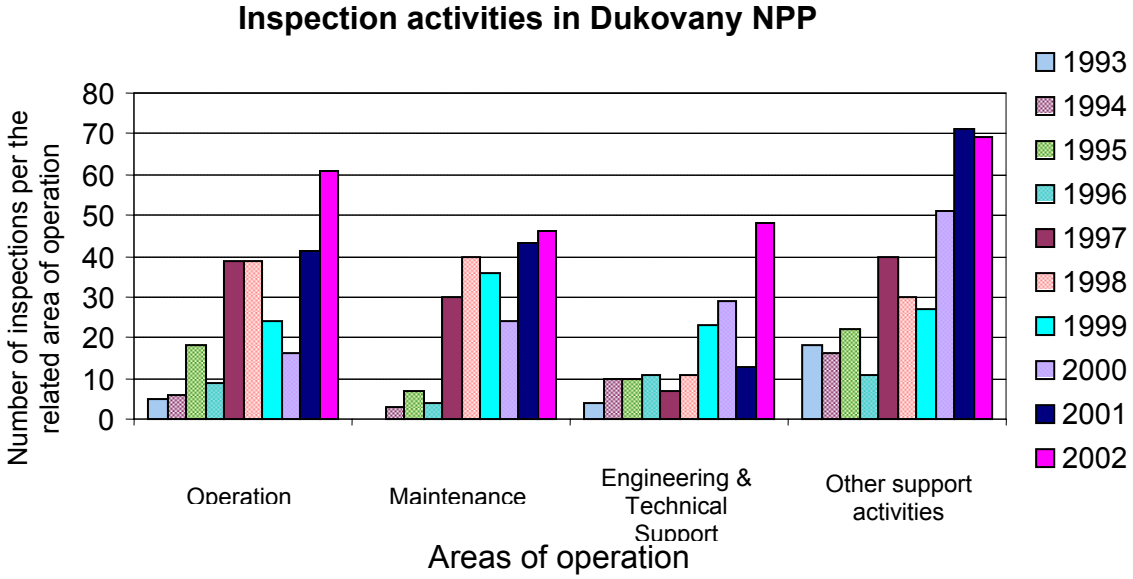
The inspections of unit readiness for operation resumption after refueling revealed no problems that would in any way restrict the EDU units *power-up to the minimum controlled power after refueling*. The tightness tests of hermetic spaces were executed as L&Ps required, and the maintenance crew training was organized as expected. A minor deficiency was found when examining the observance of requirements set forth in the Operation Check Program - 3 out of the total 37 actuators were not checked as often as prescribed. The imposed corrective action required that the EDU Operation Check Program is amended so as to reflect the SÚJB's requirements.

Technical and Engineering Support

The Technical and Engineering Support is the only sphere where SÚJB disclosed recurrence of minor deficiencies. The inspection revealed inconsistencies in the Quality Assurance System, namely in the organizational provisions to be implemented within the units' LAN network; the provisions taken did not coincide with the requirements of controlled documentation in the field of IT. Some partial routine activities have not yet been regulated by management documents elaborated down to a level lower than that of Management Procedures. The examined management documents were not being updated so as to refresh their links to the follow-up management documents and legal regulations. The existing Management Procedures did not contain a clear description of the partial activities and information flows (flow charts were missing). The unveiled shortcomings shall be targeted by the subsequent SÚJB's inspection effort. Being of a formal character, the deficiencies do not deteriorate the possibility of further successful operation of the facility.

Support Activities

The system of nuclear material tracing being checked complied with the submitted tracing and operational documentation. The inspections did not disclose any safety significant failures and consequently no corrective measures were required. The nuclear materials were physically protected in full conformity to the controlled conditions and the EDU site guarding by the security agency was found (at all check points) to be in keeping with the approved documentation. The Interim Spent Fuel Storage operated flawlessly throughout the entire period of trial and continuous operation; the nuclear safety-relevant quantities and their values were monitored in a manner superior to the requirements. The issues of emergency preparedness were found properly heeded. The shortcomings revealed during the inspections were remedied with corrective actions implemented within the stipulated deadlines.



2.1.4 Evaluation of Safety Indicators

Upon proper processing, the 2002 safety indicators lead us to declare that EDU has kept its previous high level of nuclear safety in most of the assessed areas. If there are any indicators demonstrating a mild decline in the level achieved during the previous period, then the indicators show no systematic trends but only common fluctuations admissible when statistically evaluating small numbers.

As regards the significant events, the previous period saw a decrease to the minimum figures, and the level is maintained. Obviously, the indicator values returned to the bracket of small random figures which make sufficiently sensitive tracing of a trend rather difficult.

The safety system operation indicators also demonstrate a very high level of performance. The experienced increase in the average unavailability rate of the unit safety system was caused by a prolonged unavailability of one hydroaccumulator, as well as by the necessity to provide, before the unit outage, service water for a reconstruction of one genset plant. Consequently the related safety system availability diminished. Still, as a set, the reliability indicators of safety systems have reached the excellent 100% of operation reliability and almost 100% of start-up success rate.

Taken all in all, in 2002 the barrier tightness reached the best value achieved throughout the entire history of EDU operation. The radiation protection safety indicators remain as exceptionally high as usual, thus evidencing the attention paid by the Operator to the issues of radiation protection.

The above summary of results achieved in the individual sets of safety indicators presents a sufficiently detailed overview of the way in which EDU ensures nuclear safety and radiation protection; the results do not indicate any potential weak points for the future.

2.2 Temelín Nuclear Power Plant

2.2.1 Temelín NPP start-up & operation

In 2002 none of the two Temelín NPP (ETE) units experienced any events resulting in an impermissible release of radioactive substances into the air. In consideration of nuclear safety, the trial operation of Unit 1 has been assessed as safe. Perceived from the same angle, the Unit 2 start-up process proceeds in conformity to the approved programs. The year being evaluated herein witnessed repeated containment tightness tests conducted at both units. Both units performed well, deep below the design-envisaged (*upper-limit*) values. Neither of the units violated the Limits & Conditions.

With the *power start-up* accomplished (in several stages, until the unit reached 100% of the nominal power N_{nom}), the first ETE unit was treated to the *final complex testing* stretched over the period of 144 hours. Starting from 10 June 2002 the unit has been going through the last stage of *power start-up* - i.e. through the trial operation. In March and December the unit operation was interrupted by two organized outages; these occasions were utilized to remedy some discrepancies between engineering parameters revealed in the tests. Moreover, the outages were exploited to perform maintenance as required by the approved Schedule of Operation Checks. In the course of October and November the reactor was operated with the power reduced to the range of 80% to 100% of nominal power. This provision aimed to create a nuclear fuel reserve intended to last for a prolonged fuel campaign necessitated, in contrast to the previous expectations, by the absence of Unit 2 power.

Early in March SÚJB granted permission to commence the active testing of Unit 2; the first fuel was loaded to the Unit 2 reactor on 4 March. The reactor was then being prepared for reaching the *minimum stabilized controlled status* (MSKS); the initial controlled fission chain reaction occurred on 29 May 2002. Subsequently, the process of active start-up itself happened in predetermined power steps between 30% and 55% of N_{nom}. The smooth process of Unit 2 start-up was interrupted by two prolonged unscheduled outages, both necessitated by the need to replace the rotor of the main turbogenerator set (TGS).

2.2.1.1 Operation anomalies

Unit 1 experienced altogether 14 anomalies rated INES "0", i.e. an event manageable with appropriate procedures and without exceeding the Limits & Conditions (L&Ps), while the analogous figure for Unit 2 was 9. The *non-unit* and common facilities developed 3 events rated INES "0". The anomaly occurring on 7 February in Unit 1 was rated INES "1", i.e. nuclear safety significant event. The anomaly appearing on 28 August in Unit 2 is still being assessed by SÚJB. Several of the recorded anomalies impacted the Unit 2 start-up process, and translated into either short-term or long-term power reductions. These occurrences included, for example, both the anomalies related to the ground-faults signaled at the rotors of the Unit 2 main generator in July and August; the events entailed unscheduled outage of the Unit. Another anomaly experienced in Unit 2 was caused by a protection trip in a 110 kV switchyard during a thunderstorm. This event led to power supply loss and the subsequent activation of gensets. In view of the emergency planning, the anomaly was categorized as Degree 1 Abnormal Event without release of radioactive substances into the environment.

In 2002 the protection system of Unit 1 was actuated once, and there were three interventions by the *power reduction system* LS(d), all causing reactor shutdown. The first shutdown thus initiated happened on 11 January 2002 during the process of power increase to the level of 100%; then, the *power reduction system* mistakenly evaluated a fault in the cooling water flow rate metering device as a "failure of coolant pumps" and shut the reactor down. The metering device fault resulted from a drop in voltage at the 6 kV power supply sections brought about by a failure of the generator excitation system. The second shutdown effected by the *power reduction system* (LS) occurred on 14 January 2002 due to the failure of the last still operating *turbine feedwater pump* (TBN) experienced when testing the "emergency shutdown and operation resumption of one leg of low-pressure regeneration system". The third shutdown rested in reactor scram (ROR) activated in Unit 1 by the safety protection system during the already mentioned event of 7 February 2002. With the GTX protection testing in progress, the generator switch unexpectedly tripped and the turbogenerator assumed control by rpms. Consequently, the power reduction system lowered the reactor power to approx. 38%. As a result of improper TNČ pump performance at this power level, the flow rate of feedwater used to supply steam generator (PG) dropped, nevertheless the *power reduction system* failed to evaluate this situation properly, and consequently the water levels in all PGs lowered. The reactor scram was actuated by the "PG level below 166 cm" signal.

The last reactor shutdown initiated by the *power reduction system* came as a consequence of a preventive operator-activated shutdown. A transient process induced by a non-standard behavior of I&C equipment destabilized the secondary circuit operation and caused a drop of water level in the feedwater reservoir.

Unit 2 experienced altogether two reactor scrams tripped by the protection system, both during the process of active testing. In the first case the reactor was shut down manually using the LS(d) pushbutton in response to the failure of all *turbine feedwater pumps*. With the reactor thus shut down, the reactor scram system (ROR) was activated due to the low pressurizer level, but this activation was just an automatic consequence of what preceded. The second shutdown of Unit 2 reactor occurred during power-up on 31 December due to a false indication of water level increase in one steam generator (PG). The ensuing transient process was accompanied by a real drop in water level in the effected PG down to the value of the protection system actuation.

All the above-mentioned actuations of the *power reduction system* were unscheduled and were reported to SÚJB as required by Atomic Law. The Table below summarizes the activations of the *power reduction systems* and the *reactor scram systems*:

Actuation of *power reduction systems*

Table 2.2

1	2	3	4	5
Unit 1				
1	11.1.2002	100%	LS(d)	mistaken evaluation of "coolant pump failure" caused by the failure of a device used to meter the coolant water flow rate.

2	14.1.2002	100%	LS(d)	failure of both *turbine feedwater pumps* (TBNs) while testing one leg of low-pressure regeneration
3	7.2.2002	100%	ROR	ill-handled transient accompanied with "steam generator (PG) level drop".
4	24.8.2002	100%	LS(d)	reactor manual shutdown in response to a transient process effecting the feedwater reservoir level
Unit 2				
1	28.8.2002	29%	LS(d)	Failure of *turbine feedwater pumps*, manual shutdown of LS(d) system plus a follow-up ROR actuation related to the pressurizer (KO) water level.
2	31.12.2002	35%	ROR	TG power overshoot

2.2.1.2 Adherence to Limits & Conditions

As observed, no Limits & Conditions (L&Ps) were violated in 2002. Early in the year, before the active testing was commenced, the Limits & Conditions of Unit 2 safe operation were approved together with some new L&Ps intended to govern the sustained operation of the Fresh Fuel Storage Facility. SÚJB approved altogether 9 document changes; of them six concerned a Change Permit or were inspired by experience gained during the start-up stage; two changes rested in comprehensive L&P revisions of both units; and one followed from an organizational change introduced in ČEZ, a.s. (newly established "Nuclear Power Engineering Department"). Moreover, an L&P change designed to regulate nuclear waste treatment was approved.

2.2.2 SÚJB Inspection Activities

SÚJB inspection activities performed at the Temelín NPP in 2002 have been documented in 76 Inspection Reports filed as closed. The inspections followed primarily the approved half-year Inspection Schedule. In addition, some further inspections were conducted in response to any operation anomalies emerging.

With the fuel loaded, and particularly with the trial operation commenced, the Unit 1 inspection activities concentrated on operation checks. The unit was inspected mostly in reliance on periodically conducted routine checks aimed at monitoring the basic unit parameters, adherence to the applicable Limits & Conditions of safe operation and operation regulations. Furthermore, the Office performed systematic checks of transient and off-normal conditions; operating staff training; tests of safety system availability; and the operational culture generally. A specialized inspection effort was spent to review the readiness of Unit 1 for the commencement of tests at the 100% N_{nom} power level as envisaged in the Program of Staged Power Start-Up. We found minor deficiencies in documenting the already completed activities. The inspectors assessed these shortcomings and came to the conclusion that they did not preclude the test commencement at the power level of 100% N_{nom}.

A sweeping inspection was aimed to assess whether Unit 1 was ready for the trial operation; the inspectors scrutinized the results of tests conducted per the *power start-up* (ES) program at N_{nom} = 100%; the Unit 1 readiness for trial operation as prescribed in the submitted Preparedness Protocol; and the adherence to the SÚJB's requirements included in the relevant rulings and reports with deadlines to be met before the trial operation might commence. The revealed shortcomings were remedied during the inspection. Some persistent defects and jobs still outstanding were assessed whether being prohibitive (or not) to the trial operation commencement in compliance with the approved documentation. Based on the inspection thus effected, SÚJB proclaimed the ETE Unit 1 ready for trial operation commencement.

The checks related to the Unit 2 start-up process focused mainly on selected tests to be performed according to the approved start-up programs; the checks attempted to appraise the level of readiness for the individual stages of the unit active testing, namely the observance of testing criteria necessary to be met before the program could proceed to the next stage; and the preparedness of the unit and the associated systems to meet the Limits & Conditions stipulated for the envisaged modes of operation and power levels.

A specialized inspection effort was spent to review the readiness of Unit 2 for the commencement of active testing - physical start-up (AV-FS). Since the inspection found no shortcomings preventing the AV-FS commencement, the relevant permission was granted.

Another specialized inspection at Unit 2 monitored fuel loading, with particular attention paid to the fuel handling and its compliance with the procedures envisaged in the relevant programs; to the provisions designed to prevent clean condensate ingress; and the observance of L&Ps at Unit 2. The inspectors were satisfied that fuel loading followed the approved programs. Based on random checks and the scrutiny of submitted protocols, the prescribed tests were assessed as successfully performed.

SÚJB inspectors also made a comprehensive inquiry into the fulfillment of duties imposed upon the *controlled person* in relation to the investigation conducted by the Failure Commission (PRK) and the Start-Up Failure Commission (PRKS) in the period of July - December, 2001. These Commissions reviewed the implementation of corrective measures ordered in SÚJB protocols. Selected results of investigations performed by PRK and PRKS were scrutinized and rated in accordance with the INES scale. Moreover, the Office verified if the corrective actions inflicted by the *controlled person* upon himself/herself were duly executed. The examination showed that the corrective actions were performed except for four, nevertheless the inspectors accepted these defaults as not impinging on nuclear safety and not affecting the further course of the start-up process.

The inspections of Unit 2 start-up proved that the *controlled person* duly reflected the expertise developed in the Unit 1 start-up into the programs used to govern Unit 2; consequently, the Unit 2 start-up proceeded without any significant events, featured a higher safety culture, and was devoid of any significant or prolonged interruptions.

2.2.3 Evaluation of inspection activities in the assessed areas

SÚJB's inspection activities yielded these summary evaluations:

Operation

The bulk of ETE 2002 activities fell into the category of operation; therefore the activities were duly heeded, particularly in the form of monthly checks. The results of inspections warrant the conclusion that the plant was operated in compliance with the Limits & Conditions and as the nuclear safety principles required. Nonetheless, in several specific cases the applicable operation regulations were found failed and even a requirement of an SÚJB Operational Decree was revealed compromised.

Maintenance

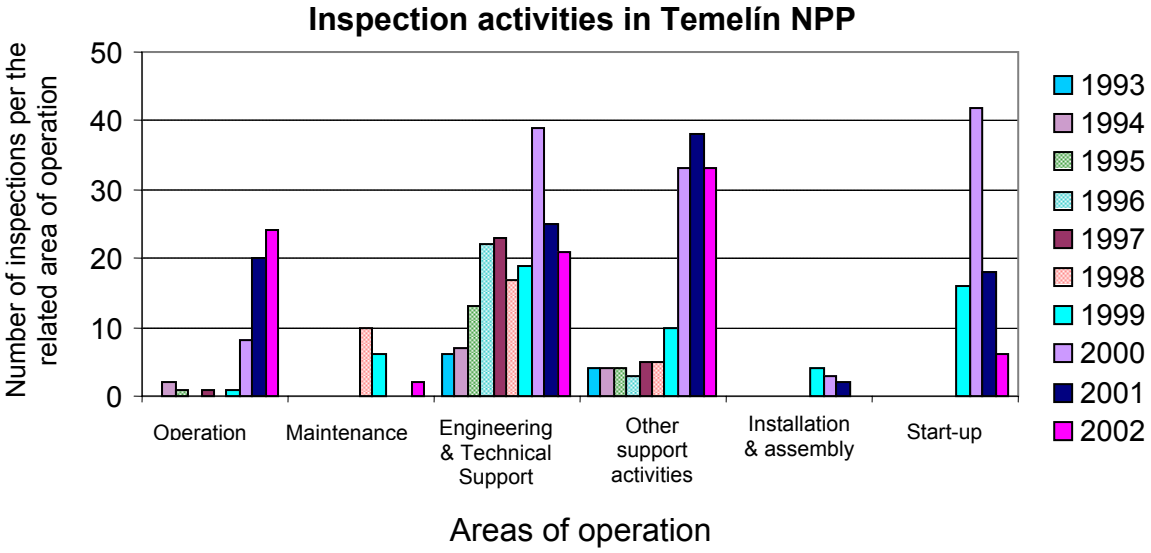
The maintenance activities were assessed based on two reports on periodic checks; the checks aimed to verify the proper execution of tests designed to investigate the condition of instruments, including their calibrations. Investigation conducted per the relevant Limits & Conditions proved that the equipment was capable of performing the safety functions. Some shortcomings were revealed in the adherence to operational procedures used to govern the instrument tests.

Technical and Engineering Support

As regards technical and engineering support, in 2002 some faults persisted, particularly in the application of Quality Assurance Systems. Partial discrepancies were found in the quality assurance documentation being inspected; especially the requirements for the documentation use were not elaborated in sufficient detail, and in some cases the higher level management documentation was not properly linked to the lower level management documentation. Generally, the *change control procedure* followed the requirements for work practices, but the practices were not observed in all specific cases (a change was implemented without passing through the full *change control procedure*). Some test procedures were found incomplete, and a few provisions were introduced to prevent repeated mistakes proved to lack efficiency.

Support activities

All requirements laid down by the system of State Registry and Inspection of Nuclear Materials and the handling of nuclear materials were fulfilled. ETE takes consistent care of the operation, maintenance and common repairs of the engineered safety features in compliance with the requirements of the relevant documentation. Also the Fresh Fuel Storage Facility is operated in conformity to the approved documentation. The emergency preparedness was found to be very good.



2.2.4 Evaluation of safety indicators

The methodology of determining the safety indicators (as described in the relevant paragraph on the Dukovany NPP and included in the Annex hereto) cannot be employed for the Temelín NPP yet, since it may be applied only to nuclear facilities in sustained operation, not to the plants at the stages of start-up or trial operation.

2.3. Research nuclear facilities & Fresh Fuel Storage Facilities

2.3.1 LVR-15 Reactor Based at ÚJV, a. s. in Řež

The Reactor Operation Plan for 2002 was fulfilled. When operated in the power mode, the reactor delivered 24,827 MWh. Since the beginning of trial operation in 1989 (after an overhaul) the reactor has supplied 293,717 MWh. The reactor operated safely and reliably; it was used primarily to satisfy the needs of foreign users engaged in material-related research of components for nuclear power facilities. A minor part of the reactor operation was employed to produce radioisotopes and radiation-treated silicon; to support experiments needed for basic research in nuclear physics; and to irradiate patients. In July 2002 the ÚJV Řež complex, including the reactor building, was affected by a flood, nevertheless no radioactive material escaped, and the nuclear safety and radiation protection was neither affected nor violated.

In the course of the year SÚJB was submitted an updated Final Safety Analysis Report, including the Limits & Conditions of safe operation, rephrased so as to duly reflect the new legislation and, before their effectivity date, also the new recommendations expected to be approved by MAAE (IAEA). Based on the documents submitted, and with the gravest flood consequences remedied, SÚJB granted a temporary approval for continuation of the reactor's operation. The period just past witnessed scheduled checks aimed to scrutinize the reactor; experimental facilities; engineered safety features; nuclear materials; waste materials; and emergency preparedness. One unscheduled check was performed to investigate how the Operator handled the flood and rectified its aftermath. The inspections did not reveal any violation of the Limits & Conditions of safe operation, nor any dereliction of duty in taking safety precautions during the flood.

2.3.2 LR-0 Reactor based at ÚJV in Řež

In the 1st half of 2002 the reactor, used to support experimental activities (measurements and irradiation), was operated for 562 hours. LR 0 accommodates REDOS, a project partly funded by EU within its 5th Program designated "In-Core Dosimetry of VVER 1000 Reactors". In the 2nd half of 2002 LR 0 was out of operation and the time was employed to compile the documentation needed to obtain an approval for further operation. When compiled, the documentation was submitted to SÚJB for assessment; since it was found incomplete, the administrative procedure was suspended and the documentation returned to be finalized. During its period of inactivity this reactor, too, was hit by the flood. The applicable Limits & Conditions were not violated and no radioactive materials escaped. The flood impact on the reactor has been remedied. This reactor was also treated to scheduled and unscheduled checks intended primarily to scrutinize the documentation preparation and the Operator's handling of the flood situation and its consequences; no faults have been found.

2.3.3 VR-1P training reactor at FJFI ČVUT

The VR1 training reactor operated in compliance with the approved Limits & Conditions, safely and reliably. The reactor continues to be used for teaching purposes (also other than those pursued by the Czech Ministry of Education), particularly for training courses organized by ČEZ, a.s. Training Center. The instruction required that the reactor be employed as a test bed for a basic criticality experiment; it was performed successfully in the B3 core. To suit ETE purposes, the facility tested neutron detectors and neutron oscillators. Moreover, it was utilized to innovate the safety train and control rod actuators for the VR 1 reactor. In 2002 VR-1 was operated for 965 hours.

2002 saw scheduled checks focused on what is known as a criticality experiment, emergency preparedness, nuclear safety and engineered safety features employed to offer physical protection. One unscheduled inspection aimed to verify the Operator's handling of the flood and its aftermath. Another unscheduled inspection concentrated on the innovation of safety train and control rod actuators. VR 1 was impacted by the July flood while it was shut down for an outage. The flood did not cause any radioactive material escape, neither did it encroach upon any principles of nuclear safety and radiation protection. The completed inspections did not reveal any defects nor any violation of Limits & Condition of safe operation.

2.3.4 Fresh Fuel Storage Facility in Temelín NPP

The Fresh Fuel Storage Facility has been in trial operation since 1996. The period of trial operation embraced all technology operations, including the loading of nuclear fuel into both Temelín NPP units. Since 1996 the inspection results have attested to the storage facility safe operation.

As the schedule of inspections required for 2002, SÚJB verified the observance of all Limits & Conditions of the fresh fuel storage safe operation, and checked its compliance with all the relevant conditions stipulated in SÚJB´s decisions on storing fresh fuel throughout the trial operation.

In May 2002 ČEZ, a.s. applied for a permit to make this nuclear facility operational. Since all the legal requirements were met and the trial operation was provably troublefree, in June 2002 SÚJB issued a decision granting permission to put the Fresh Fuel Storage Facility into operation.

2.3.5 Fresh Fuel Storage Facility in Dukovany NPP

As the schedule of inspections required, SÚJB examined the conformity to all Limits & Conditions of safe operation and checked the facility for compliance with the conditions stipulated in SÚJB´s decisions imposed in the previous period. No shortcomings were disclosed.

2.4 Further SÚJB inspection activities

2.4.1 Handling of spent nuclear fuel

2.4.1.1 Interim Spent Fuel Storage Facility in Dukovany NPP

In 2002 SÚJB endeavored primarily to investigate how the Limits & Conditions required for sustained operation of the Interim Spent Fuel Storage Facility (MSVP) were observed. The operator monitored the major physical quantities of the storage facility, such as the pressure between the primary and secondary lids of each of the CASTOR 440/84 canisters (indicative of the packaging tightness); dose equivalent rate needed to map the radiation situation within MSVP facility and in its vicinity; and the surface temperatures of all the deposited canisters. The values obtained complied with the SÚJB approved values as included in the Limits & Conditions of the MSVP sustained operation. Apart from the inspections of monitored physical quantities, the Office checked the MSVP hall for proper delivery and exhaustion of ventilation air. The checks & inspections disclosed no shortcomings. As of 31 December 2002 MSVP housed 46 CASTOR 440/84 canisters accommodating 3864 fuel assemblies altogether.

2.4.1.2 Spent Fuel Storage Facility in Dukovany NPP

Early in 2002 the Office began to assess the Preliminary Safety Analysis Report on the Spent Fuel Storage Facility (PBZ SVP) based on site of the Dukovany NPP. The submitted documentation was gradually amended so that eventually it duly reflected the SÚJB´s requirements. When amended, the document received SÚJB´s affirmative assessment, and based on the assessment a decision on Construction Permit for the new nuclear facility - Spent Fuel Storage Facility on Dukovany NPP Site - was granted.

2.4.1.3 Spent Fuel Storage Pool in Dukovany NPP

As of 31 December 2002 the spent fuel pool on Unit 1 stored 578 fuel assemblies; 619 fuel assemblies were stored on Unit 2; and on Unit 3 the figure was 463, which makes 2288 fuel assemblies altogether.

2.4.1.4 VAO ÚJV Řež a. s. Storage Facility

In 2002 the Office made three inquiries into the operation of the High-Level Waste Storage Facility (VAO). The first inspection aimed to check the VAO operation before the Operation Permit was granted. Since the regulatory requirements were met, and the previous operation proved troublefree, in March 2002 SÚJB issued a decision permitting the VAO facility operation. The second inspection scrutinized a selected range of Limits & Conditions of safe operation, as well as the documentation needed for the Limits & Conditions updates. In the conclusion of the relevant Inspection Report the Office ordered to amend the submitted documentation so that it corresponded with the legal requirements. The last inspection focused on the VAO facility operation and the observance of updated Limits & Conditions as approved in the SÚJB decision. The check found the facility operation normal, and the monitored limits met. As of 31 December 2002 the VAO facility stored 206 EK-10 fuel assemblies, out of which 190 were deposited dry in bay #V and 16 were immersed in a pool together with 228 fuel assemblies of the IRT-M or IRT-2M types.

2.4.1.5 DIAMO, state-owned company

In February 2001 DIAMO, a state-owned company, branch plant GEAM Dolní Rožínka, applied for a permission to operate a nuclear material storage facility expected to be rated as *a nuclear facility*. In response to an amendment of Act 13/2002 enacted to amend Act 18/1997 Coll., which removed the facilities used to store uranium concentrate from the rank of nuclear facilities, the company withdrew the application, and asked that the administrative procedure be cancelled. The Office obliged.

2.4.2 Nuclear material transport

In 2002 four occasions of on-site spent fuel transport were organized within EDU, and ten on-site fresh fuel transports took place within ETE. Six international transports of fresh fuel were routed from the Russian Federation to EDU. In 2002 no fresh fuel was internationally transported to the Temelín NPP. In addition, on seven occasions the uranium concentrate was transported internationally from DIAMO, s.p. to France; three times to the Russian Federation; and twice to Canada. Moreover, fifteen inland transports were organized to transfer natural uranium oxides from UJP Praha Company to glass works.

As regards radioactive material transport, SÚJB conducted 10 inspections: four focused on the international transfer of nuclear materials, three on on-site transfer, one on inland transfer, and one inspection aimed to scrutinize the transport of high-level radionuclide sources. Moreover the Office checked the propriety of testing conducted to examine the transportation canisters for radioactive materials and to test some selected radioactive substances in the Testing Plant of Canisters. The checks proved that the nuclear materials and selected radioactive substances were transported in conformity to the requirements for nuclear safety, radiation protection, physical protection provided by engineered safety features, and emergency preparedness.

SÚJB assessed submitted documentation of canisters whose approval for use had expired, found the documentation satisfactory, and based on the satisfactory

assessment approved seven canisters (four of foreign origin) as types suitable for the transport of radioactive materials. Through the same procedure another nine canisters were approved as suitable types based on new applications (three of them of foreign origin).

Last year, with the Atomic Act and the pertinent Decrees amended, SÚJB organized two workshops for the entities licensed to transport nuclear materials and selected radioactive materials, as well as for the manufacturers and importers of canisters used to transport, store and deposit nuclear materials and radioactive substances. The workshops aimed to clarify the legislation enacted to regulate this branch of business; therefore the participants obtained information on new requirements entailed by the implementation of EU Directives and EU Council Ordinances into our legal system.

2.4.3 Engineered safety features of nuclear materials & facilities

In conformity to the Schedule of Inspection Activities encompassing both half-years of 2002, SÚJB performed 14 scheduled and 4 unscheduled inspections focused on engineered safety features used to offer physical protection to nuclear materials and nuclear facilities, and 7 inspections of engineered safety features applied to nuclear materials in transit.

2.4.3.1 Dukovany Nuclear Power Plant

A comprehensive check of engineered safety features of nuclear materials and facilities conducted at EDU proved that the License Holder met the requirements for the manner in which the nuclear materials and facilities are to be physically protected; contracted by the SÚRAO Praha administration the License Holder takes care of physical protection of the ÚRAO Dukovany repository as an external supplier of services. The system of Engineered Safety Features (TSFO) has been very reliably operated for a long time; it is continuously maintained and step by step upgraded. The second stage of TSFO revitalization was successfully completed with the complex testing. The stage aimed to establish a Back-Up Control Center; to adjust cabling for the control system; and to reconstruct the isolated zone of the EDU security guarded area. Both these activities were incessantly kept under close watch by SÚJB. The security staff ensure the physical guarding of the site as the approved documentation requires. As an unscheduled inspection proved, during the NATO summit the nuclear materials and facilities received enhanced protection in close cooperation with the Czech Police and BIS (*secret service*).

2.4.3.2 Temelín Nuclear Power Plant

In ETE, too, a comprehensive check of the engineered safety features used to offer physical protection to nuclear materials and facilities proved that the License Holder exerts an unceasing effort to provide for the approved engineered safety features and takes care of their operation, upkeep and repairs. The security staff ensure the physical guarding of the site as the approved documentation requires. During the NATO summit held in Prague, the plant introduced every measure needed to enhance the effectivity of physical protection. SÚJB checked the adopted measures through a continuous unscheduled inspection.

2.4.3.3 ÚJV Řež a. s.

In cooperation with and financially supported by US DoE and the Sandia National Laboratory the License Holder completed the implementation of the Engineered Safety Features (TSFO) used to provide physical protection for nuclear materials and facilities in ÚJV Řež a.s. With the complex testing of TSFO successfully completed, SÚJB approved of the new method of physical protection. While the TSFO system was unavailable due to the flood consequences, the continuity of physical protection was secured by special means adopted *ad hoc*. Upon removing the flood consequences, the TSFO system gradually entered into a mode of continuous operation and now it meets the approved requirements for proper physical protection. SÚJB staged an unscheduled inspection aimed to verify the enhanced measures of physical protection introduced throughout the Prague NATO Summit.

2.4.3.5 Nuclear Engineering Faculty of Czech Technical University, Prague

The License Holder pays incessant and proper attention to the engineered safety features implemented to provide physical protection. The features are being systematically developed and enhanced. A close cooperation between the License Holder and the Czech Police is perceived as beneficial; the Police operates a Centralized Protection Console to which the TSFO system is connected. The License Holder provided for full-scope physical protection of nuclear materials and facilities also during the flood and afterwards, when the area experienced a blackout and a loss of phone connection. In conjunction with the Czech Police the facility introduced additional measures to ensure EZS operation and to strengthen the system of guarding. An SÚJB inspection proved also that during the Prague NATO Summit proper steps were taken to provide for physical protection.

2.4.3.6 SÚRAO, Dukovany Radioactive Waste Repository

The inspection of adherence to administrative and technical requirements for engineered safety features in the Dukovany Radioactive Waste Repository revealed no deficiencies and deviations from the approved manner of securing physical protection, as contractually provided for by ČEZ, a.s., Dukovany NPP. The engineered safety features employed to provide for the physical protection of the repository are integrated into the safety features of EDU.

2.4.3.7 SÚRAO, Radioactive Waste Repository at Richard u Litoměřic

The inspection found no faults and deviations from the approved manner of securing physical protection of nuclear facilities. The License Holder boosted the efficiency of the previous physical protection of the repository by upgrading the engineered safety features and installing PTV. These facts were reflected into the newly submitted documentation; upon assessing the documentation, SÚJB approved of the engineered safety features.

2.4.4 State Registry & Inspection of Nuclear Materials

In 2002 SÚJB executed 101 inspections aimed to verify adherence to the requirements for the treatment of nuclear items. Of this number 50 inspections

(focused on the handling of nuclear materials) were conducted in cooperation with the IAEA inspectors, and 45 inspections were performed by the SÚJB inspectors unassisted. Another six checks executed by SÚJB inspectors concentrated on the import & export of some selected items and items designed for dual use. All the inspections accomplished their objectives; also the IAEA positions on the jointly executed inspections confirmed the propriety of data as processed by the State Registry & Inspection of Nuclear Materials as well as the fact that the Czech Republic meets its international obligations entailed by the Non-Proliferation Treaty. The process of inspection and its results are documented, in detail, in the Inspection Reports; the Reports were communicated to all the relevant License Holders.

In relation to the Unit 1 trial operation and in the wake of servicing & modifications done to the IAEA surveillance system, the Office performed five unscheduled inspections in ČEZ, a.s., Temelín NPP. Twelve of the scheduled checks to be performed in ČEZ, a.s., Dukovany NPP, were somehow related to the pressure probes installed in the CASTOR 440/84 canisters stored in the Interim Spent Fuel Storage. Two unscheduled inspections were necessitated by the need to open fuel storage pool at Unit 4 to suit the purposes of a training course of new warranty inspectors (the course preparation and successful completion have become a traditional achievement of cooperation between SÚJB and ČEZ, a.s.), as well as by the need to expedite the verification of fresh nuclear fuel newly received before it could be loaded into Unit 2. Four unscheduled inspections conducted in ÚJV Řež a.s. and one performed on the training reactor at FJFI ČVUT Prague were related to the after-flood measures taken to provide for safe management of nuclear materials on the flood-affected premises of both natural and legal persons.

Last year SÚJB granted 30 new permits to handle nuclear materials. As of 31 December 2002 the State Registry of Nuclear Materials kept a list of 190 License Holders within the Czech Republic; the Holders were authorized to handle nuclear materials in 216 operational/organizational units. The figure also encompasses 11 Holders of multiple permits allowing them to handle nuclear materials in 37 operational/organizational units.

In 2002 SÚJB granted 113 permits to import/export nuclear materials, selected items, or items designed for dual use in the field of nuclear technology. Out of the number 4/14 permits concerned the import/export, respectively, of nuclear materials; 6 permits were issued for export and re-import of nuclear materials; 6/8 permits were granted for import/export, respectively, of selected items; and 62/13 permits related to the import/export, respectively, of items designed for dual use in the field of nuclear technology.

Last year, in response to the amendment of the Atomic Act and the related Decrees, SÚJB organized five workshops for the License Holders entitled to handle nuclear materials; the workshops aimed to familiarize the participants with the relevant legislation enacted in EU countries to regulate the industry, and with the new requirements following from the Supplemental Protocol to the Agreement between the Czech Republic and IAEA on guarantees based on the Non-Proliferation Treaty that became effective in 2002. SÚJB staff participated in preparation of such workshops also outside the Czech Republic. The experience obtained through these workshops was fully exploited when developing and preparing what is known as the Initial Report to be passed on to IAEA at the very end of the year, as stipulated in the Supplemental Protocol.

The Tables below summarize inspection activities pursued in 2002:

MBA Code	Number of IAEA inspections	Number of SÚJB inspections	IAEA inspection load (in man-days)
CZ-B	4	5	7 (50)
CZ-C	1	2	2 (50)
CZ-D	1	3	2 (6)
CZ-E	0	1	0 (50)
CZ-F	1	1	2 (6)
CZ-G	4	5	7 (50)
CZ-J	6	6	8 (50)
CZ-K	9	9	11 (50)
CZ-L	14	14	17 (50)
CZ-T	9	9	15 (20)
CZ-V	1	2	1 (50)
CZ-W	0	2	0
CZ-X	0	1	0
CZ-Y	0	1	0
CZ-Z	0	34	0 (6)
T O T A L	50	95	72 (438)

[1)] Inspection load permitted by the relevant *Annex on facilities* for 2002

Overview of Material Balance Area (MBA) in 2002

MBA Code	MBA designation	Type of registered nuclear materials[1)]	Quantity after FI[2)] (SQ[3)])
CZ-B	Research reactor LVR-15, ÚJV Řež a.s.	HEU, LEU, N	1.1
CZ-C	Research reactor LR-0, ÚJV Řež a.s.	LEU, N, D	4.2
CZ-D	Research laboratories, ÚJV Řež a.s.	all types	0.9
CZ-E	Škoda JS a.s.	HEU, LEU, N, D, P	0.04
CZ-F	ÚJP Praha a.s.	LEU, N, D	0.9

MBA Code	MBA designation	Type of registered nuclear materials[1)]	Quantity after FI[2)] (SQ[3)])
CZ-G	VAO, ÚJV Řež a.s. Storage Facility	HEU, LEU	1.5
CZ-J	Dukovany NPP –1, ČEZ, a.s.	LEU, D, P	265.2
CZ-K	Dukovany NPP –2, ČEZ, a.s.	LEU, D, P	254.7
CZ-L	MSVP Dukovany, ČEZ, a.s.	LEU, P	566.3
CZ-T	Temelín NPP, ČEZ, a.s.	LEU, D	59.1
CZ-V	Training reactor VR-1P, FJFI Praha	HEU, LEU	0.2
CZ-W	DIAMO, s.p., storage facilities SHR	N	([4])
CZ-X	DIAMO, s.p., o.z. TÚU	N	([4])
CZ-Y	DIAMO, s.p., o.z. GEAM	N	([4])
CZ-Z	Altogether 187 License Holders were authorized to operate 202 operational / organizational units	all types	1.2
Material removed from records due to its non-nuclear use 0.8			
Altogether 190 License Holders for 216 operational / organizational units approx. 1156.1			

[1)] HEU – High-enriched uranium, LEU – Low-enriched uranium, P – Plutonium, D – Depleted uranium

N – Natural uranium, T – thorium.

[2)] FI - Physical inventory (stock-taking)

[3)] SQ - guarantee-covered quantity; for plutonium SQ = 8 kg (total weight of the element); for HEU it is 25 kg of ^{235}U; for LEU, N and D the figure is 75 kg of total weight of ^{235}U; for thorium it is 20 t of the element total weight.

[4)] Proprietary data protected by trade secret provisions

3. State supervision of radiation protection

3. State supervision of radiation protection

The State Office for Nuclear Safety also carries out many activities in the field of health and environmental protection against the adverse effects of ionizing radiation, in particular:

- state administration and supervision in the field of radiation protection at all workplaces with ionizing radiation sources from nuclear facilities, workplaces with open and sealed radionuclide sources, and dental X-ray equipment, type approval of ionizing radiation sources, radioactive waste management and discharge of radionuclides to the environment;
- monitoring, assessment and control of personal exposure (radiation personnel, patients, individual inhabitants) including their exposure to radon and other natural sources of ionizing radiation, exposure of persons in emergency situations;
- control of activities of the nationwide radiation monitoring network including assurance of international data exchange on the radiation situation;
- nationwide records of ionizing radiation sources and nationwide records of professional radiation – work-related personal exposure;
- enforcement of legislative requirements in the field of radiation protection including enforcing corrective measures, possibly imposing penalties.

3.1 Summary of ionizing radiation sources and respective associated workplaces

The scope and demanding character of work associated with the performance of the state administration and supervision in the field of radiation protection may be presented by data on the number of the ionizing radiation sources and workplaces with such sources. Pursuant to Act No. 13/2002 Coll., ionizing radiation sources are classified according to the increasing degree of possible personal health hazards and environmental hazards into five classes – unimportant sources, minor sources, simple sources, important sources and major sources. The higher the class of the sources, the more rigid and extensive are the requirements for assurance of radiation protection; the licensing procedure is more complicated and requires a thorough professional knowledge of the source operators. Inspections are primarily focused on the management of the potentially most hazardous sources with more frequent, extensive and detailed inspections. In a similar way, the workplaces with such sources are classified into 4 categories, from the workplaces of the 1st category (the least hazardous) to the 4th category (potentially the most hazardous).

The workplaces of the 4th category and the most important workplaces of the 3rd category are as follows:

- workplaces with nuclear reactors and associated processing equipment (detailed in the 2nd section of the report), particularly 4 operated power reactors in NPP Dukovany and 2 start-up power reactors in NPP Temelín, 2 research reactors in the Nuclear Research Institute Řež, a.s. and 1 training reactor at Nuclear Engineering Faculty of Czech Technical University in Prague;
- a buffer stock of spent nuclear fuel and the radioactive waste repository in the premises of NPP Dukovany, radioactive waste repository in mine “Richard“ near Litoměřice, hot waste storage in the Nuclear Research Institute Řež, a.s.;

- uranium-mining industry workplaces – mining and processing of uranium ore in Dolní Rožínka, mine liquidation in the Příbram area and the closed mine Hamr, liquidation of buckeying in the Stráž pod Ralskem area, and liquidation of sludge beds Mydlovary,
- workplaces with large industrial irradiators, particularly workplaces for the irradiation of food (particularly spices), owned by company Artim Praha s.r.o. and the workplace for radiation sterilisation of medical stores owned by company Biostér Veverská Bitýška a.s.

Significant workplaces with important ionizing radiation sources include workplaces producing and distributing (possibly using both open and sealed) radionuclide high activity sources, i.e. the workplaces of companies CESIO Praha s.r.o., SORAD Praha s.r.o., ISOTREND Praha s.r.o., the Nuclear Research Institute Řež a.s, the Nuclear Physics Institute of Czech Academy of Sciences Řež.

The summary of important and simple ionizing radiation sources as of December 31st, 2002 is outlined in tables No. 3.1 through 3.3 by type of ionizing radiation sources.

Table No. 3.1 indicates the number of workplaces with open radionuclide sources, i.e. workplaces with an occurrence of radioactive substances in a form which does not exclude the possibility of dispersion of radionuclides at the workplace or their leakage to the environment. These sources are usually of a chemical preparation nature and not of a piece product; mostly they are radionuclides with a very short half-life, so their current activity quickly changes over the course of time. In terms of the requirements in the field of radiation protection, workplaces with important ionizing radiation sources are deemed those with open sources pursuant to decree No. 307/2002 Coll. the workplaces of the 3rd category. Workplaces with open sources of the 1st and 2nd category are deemed those with simple ionizing radiation sources. Table 3.1 does not include the above workplaces with open radionuclide sources.

Table No. 3.1. Workplaces with open radionuclide sources

	workplaces of the 3rd category pursuant to decree 307/2002 Coll.	workplaces of the 1st a 2nd category pursuant to decree 307/2002 Coll.
humane and veterinary medicine	4	147
industry	1	15
other applications (research etc.)	5	124
total	10	286

Table No. 3.2 indicates the number of sealed radionuclide sources, i.e. ionizing radiation sources encapsulated and tested in such a way that under predictable conditions of the application, the dispersal of radionuclides at the workplace or their

leakage to the environment are eliminated. Sealed radionuclide sources have piece character; except for calibrating sources they are not applied directly, but are fitted into respective devices (e.g. crack detection or logging sets). The number of particular sealed radionuclide sources is not identical to the number of facilities with sealed radionuclide sources – in practice such facilities can, either gradually or simultaneously, include more sealed radionuclide sources and not even in the same number (typical of brachytherapy).

Table No. 3.2. Facilities containing sealed radionuclide sources

	important ionizing radiation sources	simple ionizing radiation sources
health service	746	0
industry and other applications	1,046	3,832
total	1,792	3,832

Table No. 3.3 indicates the number of radiation generators, i.e. facilities where ionizing radiation is generated only during operation (e.g. X-ray equipment). The radiation generators are (in compliance with the definition in Act No. 13/2002 Coll.) deemed only such facilities whose operation results in radiation of power exceeding 5 keV. If (such as e.g. X-ray diagnostic apparatus) the combination of one generator with several X-ray tubes is possible, the number of generators is stated. An increase in the number of important ionizing radiation sources – radiation generators in comparison with 2001 is caused by a change in classification of the ionizing radiation sources based on a new legislation pursuant to decree No. 307/2002 Coll., on radiation protection effective from July 1st, 2002.

Table No. 3.3. Radiation generators

	important ionizing radiation sources	simple ionizing radiation sources
humane and veterinary medicine	2,689	4,132
industry	8	539
other applications (research etc.)	8	215
total	2,705	4,886

Pursuant to Act No. 13/2002 Coll., the use of the minor sources does not require any permit, however their reporting to the State Office for Nuclear Safety is necessary. The total number of these recorded sources is nearly 160,000. Unimportant ionizing radiation sources are not even subject to the reporting duty, because the nature of these sources is not hazardous to health and environment – these sources are not even subject to state records.

3.2 Extraordinary cases

Over the course of 2002, 82 extraordinary cases[1] were reported and investigated that were associated with ionizing radiation source management or activities resulting in exposure.

This concerned:

- 41 vehicle captures (railway wagons, trucks) transporting iron scrap; the vehicles were captured by measuring equipment at the entries into metallurgical works, at scrap yards or during border control of the transport. This concerned in 20 cases the capture of scrap contamination with natural radionuclides (in particular Ra-226), in 8 cases the capture of materials contaminated with artificial radionuclides (in particular Co-60), while 13 cases concerned the imports or exports of contaminated material from and to abroad.
- 20 cases concerned the capture of collective wagons at the entry into waste incinerating plants where after dismantling the cargo there were 12 cases of isolation of the objects, materials contaminated with radionuclides used in therapy and diagnostics at nuclear medicine workplaces (Tc-99m, I-131, I-123); in 8 cases objects (dials – magnetic needle, ampoules, rollers, compass) were found containing natural radionuclides (Ra-226), or contaminated with artificial radionuclides (In-111), fire detectors.
- In 2 cases apparatus were captured – lightning arresters (containing radioactive material) and a calibrating source at the scrap yard.

In all of the above cases, based on the decision of the Inspection of the State Office for Nuclear Safety, contaminated materials were either returned to the carrier or isolated and safely stored or located, possibly released for further transport.

- 13 cases concerned false reports, unconfirmed suspicions – ampoules with fluid, a metal barrel with a combustible, a tank, electric motors, tires, parcel post package, suspicion of ionizing radiation sources in a passenger car, exposure by fire detector, illegal transport of ionizing radiation sources.
- 2 cases concerned persons detained at the border crossing who, after their examination at the workplace of nuclear medicine, turned out to be contaminated with radionuclides.
- One case concerned the contamination of an employee at NPP Dukovany.
- One case concerned a breakdown of an ionizing radiation source during therapeutic exposure in a sanitary facility.
- One case concerned the theft of a fire detector's fire alarm system.
- One case concerned the capture of a vehicle with a contaminated component.

[1] The summary does not include most cases recorded by stationary measuring systems at frontier crossings – the General Customs Directorate executed measurement at frontier crossings Mosty u Jablunkova, Bumbálka, Bartultovice, Horní Lideč – Střelná, Horní Lideč - Sidonie, Bylnice, Sudoměřice, Velká nad Veličkou. The measuring procedures and modes applied by the customs authorities in case of suspicion of capture of the sources of ionizing radiation, the substances contaminated with radionuclides or containing radionuclides were agreed with the State Office for Nuclear Safety. Once a month the General Customs Directorate transmits information on these cases to the State Office for Nuclear Safety. In fact each exceeding of recording levels was caused by legal transports of various substances (artificial fertilizers, dyes, insulating paints, glass ware, special sands, glazes, materials for metallurgical production, ceramics, building materials, electronic apparatus etc.). Regional center Ostrava (frontier crossings Mosty u Jablunkova, Bumbálka and Bartultovice) records on average 170 cases of exceeding of recording level a month, of this number only in 7 cases detailed investigations were executed that are included in the above cases.

Only 4 of these 82 cases required a special investigation:

- On 12th April 2002 in the General Teaching Hospital Praha 2, a breakdown of therapeutic source CESIOTERAX 3N-R occurred during exposure of a patient. The source remained in a working position and had to be manually shifted into rest position by means of a mechanical crank. According to the investigation carried by the service company this was a technical failure of the equipment. During the manual manipulation an uncontrolled and important exposure of the personnel did not occur. The exposure of the patient was carried out by a modification of the exposure plans.
- On 21st April 2002, source Cs-137 of activity 6.1 GBq was found in a scrap wagon. The Inspection of the State Office for Nuclear Safety identified the original owner – Sugar factory Modřany that used it as a level indicator. During reconstruction following the privatisation process the structure containing the source was liquidated and scrapped. The Inspection of the State Office for Nuclear Safety is still investigating the case.
- On 24th May 2002, source Co-60 was found at the scrap yard of KOVO SDS Karlštejn – originator unknown. Upon the decision of the State Office for Nuclear Safety the source was transmitted to the Administration of Radioactive Waste Repositories for temporary administration.
- On 13th June 2002 at NPP Dukovany during shutdown of the 2nd unit an employee of the Nuclear Research Institute Řež, a.s. was contaminated. While looking into steam generator collector his head surface was contaminated (he did not use a hard hat) due to manipulator cabling. The employee was decontaminated and sent for complete body measurement.

A specific extraordinary event in 2002 was the flood affecting the territory of the Czech Republic. Neither at the workplaces of the State Office for Nuclear Safety nor at the workplaces with ionizing radiation sources under supervision did the loss of control over ionizing radiation sources occurr that could have resulted in inadmissible leakage of radionuclides to the environment and thus in exposure of the personnel or the population to ionizing radiation sources.
The results of the investigations carried out at the workplaces under supervision that could have been or were flooded with water included the findings as follows:
In regions South Moravia (Regional Center Brno), North Moravia (Regional Center Ostrava), South Bohemia (Regional Center České Budějovice), West Bohemia (Regional Center Plzeň), East Bohemia (Regional Center Hradec Králové) neither flooding nor hazard to the ionizing radiation sources occurred which would result in loss of control over ionizing radiation sources.

In North Bohemia (Regional Center Ústí nad Labem) water flooded the secondary vocational school Lovosice with a crack detector; the sealed radionuclide source was replaced and the cover subject to a detailed inspection.
In Prague and Central Bohemia (Regional Center Prague, Regional Center Příbram-Kamenná) the floods affected some workplaces with ionizing radiation sources. In terms of assurance of radiation protection requirements, a potential risk of loss of control over the sources was presented in four workplaces to which special attention was paid by the State Office for Nuclear Safety. The first of them was the State Museum Roztoky where source Co-60 was stored in a protective container in compliance with an approved in-house emergency plan (checked by the Inspection of the State Office for Nuclear Safety with participation of the members of the Central

Bohemian rescue fire brigade) and after the water subsided control device inspections were carried out (with participation of the Inspection of the State Office for Nuclear Safety) and the revision of the source is prepared. The second location was the workplace of the General Teaching Hospital Praha 1, Klientská, where X-ray devices were flooded and they will be liquidated. The third and the fourth cases were the premises of the Nuclear Research Institute and the Nuclear Physics Institute of Czech Academy of Sciences in Řež seriously affected by the flood.

The main flood wave passed through the premises of the research institutes in Řež on 13th–14th August 2002. During the flood wave a special mode of physical protection of the premises was secured along with the security of nuclear facilities, nuclear materials, and workplaces with ionizing radiation sources controlled by the Emergency Headquarters from a standby control centre. After the water subsided under levee-flood control of the premises, the water was immediately pumped and was continuously subject to dosimetric inspection. The water was detected to be at the background radiation level. All buildings with ionizing radiation source workplaces and nuclear facilities were subject to a necessary dosimetric inspection and sampling. Special attention was paid to dosimetric measurements of buildings Large Chemistry, Small Chemistry, Small residues, reactors LVR 15 and LR 0, Cyclotron, water reservoir and the water purification station. An excess of examining levels was not detected, and local contamination in the area of the tanks with radioactive waste inside building 250 – Large chemistry did not exceed the examining level value. After water was pumped out of the premises and particular buildings, flooded areas were cleared and municipal waste was collected, and necessary sanitation was commenced. Temporary discarding areas for waste (chemicals, wood, waste metal etc.) were established within the premises and these areas were subject to dosimetric measuring prior to removal to the stockyard. In terms of nuclear safety, nuclear facilities in the Institute, i.e. reactors LVR 15 and LR 0 and high-level radioactive waste stock were not endangered. Water only reached the ground floor and the basement areas; the building of high-level radioactive waste stock was not affected. Prior to the flood, both reactors had been taken out of operation and shut down (they were subject to scheduled inspections). Nuclear fuel LVR 15 was placed in the stocks in safe places, fuel LR 0 was in the reactor; however the floodwater did not reach the reactor's bottom level. All affected buildings were under constant dosimetric control. Neither places with an increased level of exposure rate exceeding usual values nor contamination exceeding intervention levels were detected. Water samples of the sumps of particular tanks were also taken. The value of volume activity was below 50 Bq/l, which enabled their discharge to the environment. The workplaces of the Nuclear Physics Institute of Czech Academy of Sciences were affected due to flooding of the basements of buildings 221 – Cyclotron, 273 – Radiopharmaceuticals and 274 – Spectroscopy. No contamination exceeding the level of the existing background radiation was detected in any building.

3.3 Permission of activities with ionizing radiation sources

Administrative activities of the State Office for Nuclear Safety in the field of radiation protection predominantly consist of issuing permits to manage ionizing radiation sources and permits to operate a workplace with important or major sources pursuant to Act. 13/2002 Coll. This procedure concerns over 5,600 legal entities in the Czech Republic and most of them act in the field of health services.

In 2002, in association with the execution of state administration, the section of radiation protection issued a total of 7,555 decisions (of this number 7,080 decisions were issued by regional centers) including 2,928 licences of a special professional competence to perform activities crucial in terms of radiation protection. A comparison of the total number of decisions issued in 2002 with previous years shows an increase in the requirements for issue of the permits in connection with the amendment to the Atomic Act effective from 1st July 2002.

3.4 Inspection activities

In 2002, as in previous years, inspection was carried out by both Regional Centers of the State Office for Nuclear Safety and by specialised inspection teams. The activities of specialised inspection teams are focused on those specific types of ionizing radiation sources and workplaces with such sources where achieving a higher level of the unification of radiation protection practice in the whole territory of the country is required (e.g. workplaces with important and major open radionuclide radiation sources, nuclear power engineering, uranium-mining industry etc.). This system of inspections is supplemented with inspections carried out *ad hoc* by formed inspection teams, particularly for difficult inspections (in terms of expended time and their subject matter) at the workplaces with very significant sources. This procedure was verified in past years as effective as well as the only one possible which that enables inspections to be carried out with a limited number of inspectors (they also participate in extensive administrative activities of the office and in other tasks as deemed by law) in observance of the necessary expert level of the inspections.

Internal regulation VDS 043 "Planning, preparation, execution and evaluation of inspections in radiation protection" unified the practice of execution and evaluation of inspections within the whole bureau as much as possible. The evaluation system of the inspections consists of four degrees based on the following criteria:

Degree 1

Only small non-conformances were detected that neither impede performance of permitted activities nor endanger safety.

Degree 2

Serious defects; the inspected person can, under certain conditions, proceed with activities resulting in exposure.

Degree 3

Gross non-conformances impeding safe operation; some activity resulting in exposure must usually be limited or suspended until corrective measures are taken.

Degree N

The inspection was not executed or was not evaluated e.g. due to insufficient background papers submitted by the inspected person.

The inspection is carried out according to approved half-year plans based on the principles as follows:

- the inspection shall be carried out at least once every two years at all workplaces with important sources used in industry;
- the inspection of important ionizing radiation sources shall be systematically preferred to the inspections of simple sources, particularly in the field of health services;
- with simple sources, inspections at the “problem“ workplaces, where deficiencies can be expected, shall preferably be carried out;
- near natural sources, attention shall be paid to the suppliers assuring public water supply and the manufacturers of building materials.

In the field of supervision of artificial, natural ionizing radiation sources and control of activities resulting in exposure, in 2002 a total of 1,428 inspections were carried out (table No. 3.4), of which 1,225 inspections were executed directly by Regional Centers of the State Office for Nuclear Safety with holders of the permit to manage simple and important ionizing radiation sources, with the exception of the area covered by specialised inspection teams. Within the specialised inspection teams 132 inspections were carried out concerning the field of natural sources, nuclear power engineering, nuclear medicine, open sources and radiotherapy.

Table 3.4. Evaluation results of inspections in the field of radiation protection in 2002

area	number of inspections evaluated by degree (%)			
	1 or 2	3	N	total
artificial ionizing radiation sources	915 (86.2)	138 (13)	8 (0.8)	1,061
natural ionizing radiation sources	313 (85.5)	41 (11)	13 (3.5)	367
total	1,228	179	21	1,428

In addition, the section of radiation protection in fuel cycle carried out a total of 67 inspections concerning environmental discharge and radioactive waste management (not included in table 3.4); only 1 of them was evaluated with degree 3 (i.e. 1.5 %), the others were evaluated with degrees 1 or 2.

A comparison with the 2001 results (taking into account a change in evaluation in compliance with VDS 043) in the field of artificial ionizing radiation sources shows a slight improvement of the radiation protection level with the inspected entities – in 2002, 86.6% of the inspected entities were evaluated with degrees 1 or 2 in comparison with 84% in 2001.

In the field of natural ionizing radiation sources, the situation remains as favourable as in 2001, approx. 85% of inspected entities were evaluated with degrees 1 or 2. A predominant cause of degree 3 evaluation with checked persons managing ionizing radiation sources is the absence of the permit issued pursuant to §9 of the Atomic

Act; the permit is issued to an entity which over the course of time changed form or was transformed into another entity.

With manufacturers of building materials and water suppliers assuring public water supply, the most frequent reason for degree 3 evaluation is a violation of the duty stipulated by § 6 par. 3 of the Atomic Act, i.e. the duty to assure systematic measurement and evaluation of the content of natural radionuclides, to record the data and report to the State Office for Nuclear Safety.

In a total of 13 cases (i.e. less than 4%) the inspection could not be carried out (evaluation N); in 9 of these cases the activities subject to inspection were terminated, 2 cases concerned the capture of contaminated material (based on the type of ionizing radiation sources, 7 cases concerned artificial ionizing radiation sources and 4 cases concerned natural ionizing radiation sources).

In comparison with 2001 (a total of 1,269 inspections, of this number 798 carried out by Regional centers and 471 by specialised inspection teams) a slight increase in the number of inspections by approx. 15 % occurred in 2002, due to an increase in administrative acts (tests of a special professional competence and renewal of the permit to manage ionizing radiation sources) enforced by legislative changes executed in 2002, favourable data concerning inspection activities of the section of radiation protection.

Based on the inspection results, main attention in 2003 shall be paid especially:

- in the field of nuclear power engineering in NPP Temelín – to the evaluation of the progress of particular stages of commissioning of NPP Temelín and to a direct application of acquired experience in the preparation of the 2nd unit for operation; in NPP Dukovany – to the assessment of the documents related to a scheduled modernisation.
- in the field of nuclear medicine and open radionuclide sources – to the entities rendering services for nuclear medicine departments (work in controlled zones of the permit holder) and to personnel protection in connection with the adoption of methods with PET radionuclides.
- in the field of uranium activities, old loads and mining activities - to the working environment, a possible discharge of radionuclides to the environment and to compliance with approved monitoring programmes.
- in the field of radioactive waste management – to the issue of solid subject discharge to be stored at the stockyards and to the professional level of all employees of a permit holder to manage radioactive waste.
- in the field of management of artificial sources of ionizing radiation – to the inspection of the entities executing the import, distribution, production and export of the ionizing radiation sources.

3.5 Personnel exposure control

Personnel exposure at workplaces with ionizing radiation sources in 2002 was monitored by five currently existing dosimetric services – The nationwide service of personal dosimetry Praha, s.r.o., dosimetric services of NPPs Dukovany and

Temelín, dosimetric service of the Nuclear Research Institute Řež, a.s. and dosimetric service of the State Institute for Nuclear, Chemical and Biological Protection that assures personnel monitoring in uranium-mining industry (Diamo, s.p.). The licence was also issued to The Dosimetry Institute of Czech Academy of Sciences for the execution of dose calculations for the aviation personnel. A total of about 20,000 employees with ionizing radiation sources were monitored, as with every year. The doses of these employees are recorded in the Central Registry of Occupational Exposure kept by the State Office for Nuclear Safety. The preliminary evaluation of the doses shows the following:

- In NPP Dukovany in 2002 in total 2,094 employees were monitored (of this number 746 employees were the skeleton personnel of NPP Dukovany and 1,348 supplier employees), the cumulative collective effective dose was 1.04 Sv (all doses exceeding 0.05 mSv) and an average personal effective dose 0.64 mSv, the highest yearly individual effective dose was detected with an employee of the supplier organisation (13.72 mSv).
- In NPP Temelín due to hitherto performed work a cumulative collective dose was only evaluated as 31 mSv with the highest personal dose 1.21mSv on a supplier employee.
- In the uranium-mining industry, a total of 385 employees were monitored at the underground workplaces of GEAM Dolní Rožínka. The cumulative collective effective dose was 2.9 Sv, the average individual effective dose was 7.5 mSv, the highest individual effective dose in 2002 was 24.28 mSv (underground); a total of 843 employees in the uranium-mining industry were monitored with a cumulative collective dose of 4.6 Sv.
- With other industrial applications, about 2,500 employees were monitored whose average individual effective dose, depending on their profession, ranged from 1 to 2 mSv; professions with higher doses are crack detection (1.5 mSv) and logging work (3.1mSv).
- At medical workplaces with ionizing radiation sources, doses were evaluated for almost 11,000 employees. Of this number, nearly 50% had a yearly individual effective dose below recording level, remaining employees showed an average yearly individual effective dose of 1.2 mSv; with certain professions the average yearly individual effective dose is higher as usual, e.g. with doctors. Cardiologists' ranged about 2.5 mSv.
- Specialised personell such as service and inspections at the sources, a personnel of approx. 800, achieved an average yearly individual effective dose of about 0.5 mSv.

The collective effective dose in 2002 was estimated at 16 Sv. The average individual effective dose per single monitored employee was estimated at 0.8 mSv.

In 2002 decree No. 419/2002 Coll. on personal radiation ID cards came into effect. This decree mandates that the "external personnel", i.e. the personnel of category A working on a contract basis in the controlled zone of another operator, be equipped with a personal ID card. The radiation ID cards are to be issued and recorded by the Office; this decree will take effect in 2004. The system of personal radiation ID cards is to ensure a proper and complete evaluation of doses to external personnel, particularly personnel contracted for work in controlled zones of nuclear power plants.

In 2002, acute exposure of personal dosimeters with doses exceeding 20 mSv was not examined (for the relevant inspection period). Dosimetric services reported 12 cases when holders reported impersonal exposure of the dosimeters due to improper handling. This concerned in particular the personell of companies involved in crack detection.

Within the evaluation of yearly doses in 2001 (The Central Registry processes annual data only in the 2nd quarter of the following year based on the data received from dosimetric services), 50 cases were detected in which the values of personal doses exceeded 20 mSv. Of this number, however, 31 cases were personnel in the uranium-mining industry, where inspection and control of personal doses is assured continuously and these doses are naturally not re-examined. 16 cases were in the health service field where all cases were converted to attenuation through a protective apron. 3 cases of the total number appeared in the field of crack detection. All three cases were confirmed as personal doses; values slightly exceeded 20 mSv. In general, crack detection ranks among the activities where personnel exposure is relatively high (an average dose is about 2 mSv); all the same, optimisation procedures and subsequent technical measures must assure that individual doses of the personnel do not permanently move at the level of stipulated limits. This positive trend occurred in 2002 and is confirmed by the results from the Central Registry of Occupational Exposure.

In 2001, 381 cases of personal doses exceeding the examining level for a yearly personal dose of 6 mSv were detected with 90 permit holders. This concerned 47 sanitary facilities (particularly teaching hospitals), 22 companies involved in crack detection, and 21 research, service and supervisory organisations.

Based on the analysis of the conclusions of re-examination of higher doses, it is evident that the critical professional groups remain those doctors practicing intervention radiological procedures and crack detection personnel. A considerable increase in the number of re-examined cases was not recorded. We witness a negative phenomenon in the increased number of cases of the improper personal dosimeters handling – an unsecured placement, an improper placement in exposed places, improper location on the body, intentional exposure etc. In 2003 meetings with representatives of these professional groups will get underway in order to discuss efficient procedures which would result in an improvement of personnel radiation protection.

In accordance with to an amendment to the regulations concerning radiation protection (decree No. 307/2002 Coll.), a solution to radiation protection was commenced (measuring technique, professional competence examination of the companies involved in measuring, permits to perform activities, inspection etc.). This applied to activities related to work performance connected with an increased presence of natural radionuclides or with an increased cosmic radiation effect and results, or could result, in a considerable increase in the exposure of physical persons. This concerns in particular:

- plants processing natural materials with a natural radionuclide content (NORM or TENORM - Technologically Enhanced Normally Occurring Radioactive Materials)

with the possibility of their concentration in some phase of the manufacturing process,

- operations with an increased air radon level for geological and ventilation reasons, e.g. caves, underground operations, etc.
- air transport cews.

3.6 Population exposure control

The main effort made in reduction of population exposure was focused on the reduction of radon exposure in buildings that form a predominant part of the cumulative effective dose to which the Czech Republic's population is exposed. This component of personal exposure has a very wide range, and higher exposure levels are, based on experience of the past years, controllable with reasonably achievable cost. Another important component of population exposure which the State Office for Nuclear Safety focused efforts to reduce was medical exposure. This is exposure to patients subject to medical steps which apply ionizing radiation sources.

3.6.1 Medical exposure

The technique of monitoring and evaluating population exposure from sources applied in medicine is dealt with, as in previous years, mostly in co-operation with the State Institute for Radiation Protection in the field of radiodiagnostics and the Teaching Hospital Olomouc in the field of nuclear medicine. The State Office for Nuclear Safety receives, from the General Health Insurance Company, data files on examinations using ionizing radiation sources. Based on this data it carries out statistical evaluations which serve to control exposure due to medical application of ionizing radiation sources. In the 2002 evaluation, the period until 1999 was completed, and the results were used to complete questionnaires UNSCEAR for the period 1995 -1999. The results of the evaluation are drawn up in a separate report that is available in the State Office for Nuclear Safety. In 2003 the State Office for Nuclear Safety will proceed with its effort in the field of science and research to prepare a detailed technique for the evaluation of doses in radiodiagnostics, also with regard to the instrumentation of particular workplaces. The State Office for Nuclear Safety is also preparing a 2003 issue of the recommendation determining the parameters of medical examinations to be recorded at medical workplaces in compliance with decree No. 307/2002 Coll.

As part of the harmonisation of the legislation of the Czech Republic with the legislation of the European Union in the field of medical exposure, the provisions of Council Directive No. 97/43/EURATOM were included in the amendment to the regulations in radiation protection and in the health service regulations in preparation (acts on health service personnel education, the Health Care Act, etc). In this regard and as part of the guarantee of the State Office for Nuclear Safety to fulfill the Implementation plan of Council Directive No. 97/43/EURATOM, repeated meetings were held with the representatives of the Ministry of Health of the Czech Republic,

committees of societies of the Czech Medical Society of J.E. Purkyně – the Radiological Society, Nuclear Medicine Society, the Society of Radiation Oncology, Biology and Physics, the Society of Radiological Laboratory Technicians and Assistants, the General Health Insurance Company and other health service institutions. The issue of medical exposure was discussed with the representatives of the health service branch at several expert workshops and special meetings. High attention was paid to the assessment of the teaching and practical training of radiological physicists that will be, in compliance with the referred EU directive, assured in a higher number not only for the radiotherapy and nuclear medicine departments, but also for radiodiagnostic departments. The representatives of the State Office for Nuclear Safety actively participated in the work of the Working Group of Radiological Physicists that participated in the preparation of the Act on Education of Health Service Personnel (excepting doctors) and its executive regulations; the representatives of the State Office for Nuclear Safety also attended meetings on this matter, held in both Houses of Parliament of the Czech Republic. As part of the effort to control medical exposure, a translated document of the European Commission "Indicating Criteria for Image Theories" was prepared for printing after a meeting with the representatives of the European Commission in Brussels. The staff of the State Office for Nuclear Safety are members of expert commissions of Czech Ministry of Health and Czech Medical Society of J.E. Purkyně (the Commission for allocation assessment of select sanitary engineering instruments, the Commission for breast tumours screening, the Commission for the assessment of occupational diseases) applying the requirements of radiation protection for the control of medical exposure.

3.6.2 Exposure due to natural sources

The State Office for Nuclear Safety, in co-operation with the staff of the State Institute for Radiation Protection and district offices, proceeded with a target search for inhabitants residing in exceptionally high radon risk areas. The search statistics are always prepared for the entire previous calendar year. The measurement results are regularly reported to the house owners, and if an increased risk is found, these owners are notified that they may apply for an allowance from the state budget for antiradon curative measures.

The database of the results of a target search procedure is already routine operation, which enables, in addition to usual outputs, processing the results in the form of a map to the level of particular municipalities. This enables one to forecast the expected radon exposure in a municipal housing stock. This database is now being transformed into a new system of public administration.

The State Office for Nuclear Safety (directly or through the State Institute for Radiation Protection) also fulfilled other responsibilities in this area, stipulated particularly by the resolution of the Government of the Czech Republic No. 970 of 7th October, 2002 on the Radon Programme of the Czech Republic.

- the radon hazard index was determined for particular districts as the criterion for the determination of the amount of government subsidy given for antiradon curative measures in apartments in 2002; a determination of this index for municipal territories with extended powers is in preparation,

- central records were kept of the financial requirements of district offices for antiradon curative measures in school buildings and in water determined for public drinking water supply and in flats; these records will still be kept for the regions,
- a draft allocation of subsidies to particular districts and regions was prepared, preferring the consideration of required subsidies for schools and water mains,
- a meeting was held with the contact staff of all district offices concerning topical tasks of the Radon Programme; meetings with the contact staff of all regional authorities are in preparation,
- the report was prepared as to the task fulfillment of the Radon Programme of the Czech Republic; the programme lies within the authority of the State Office for Nuclear Safety,
- new development and operational tasks as solutions to the Radon Programme of the Czech Republic were set along with solution monitoring,
- opinions of the State Office for Nuclear Safety were drawn up for district offices, wich concern antiradon curative measures in 7 school buildings and 15 water mains supplying drinking water determined for public supply,
- the amendment to the Atomic Act, as part of state administration reform, assured solution to the tasks imposed by the referred government resolution upon regional authorities.

3.7 Medical aspects of radiation protection

In 2002 the State Office for Nuclear Safety assessed a total of 80 suspect cases of occupational disease, of which:

- with uranium mine personnel this concerned 71 cases of lung cancer and six cases of other diseases (skin basal cell carcinoma, acute myeloid leukaemia, chronic lymphatic and chronic myeloid leukaemia, larynx cancer and nasal septum cancer). With 31 cases of lung cancer and both cases of myeloid leukaemia, the probability of causality between the disease and work in underground uranium mines was evaluated as predominant; with seven cases of lung cancer and larynx cancer it was evaluated as boundary. In the other cases the connection between the disease and work in the ionizing radiation risk area was not proven.

- With the personnel of other jobs this concerned a total of three cases of evaluated diseases – two cases of lung cancer (a uranium mine employee and a service engineer of X-ray equipment) and breast cancer (a nurse of the nuclear medicine department). Causality between the work in an ionizing radiation risk area and the disease was not proved in any case.

The dose estimate to the foetus as a result of diagnostic examination of the mother was measured in a total of 41 cases. In two cases this concerned examination within nuclear medicine examination, while the other examinations were radiodiagnostic. Only with one patient was a higher dose estimated (18.0 mSv), in ten cases the dose

ranged from 5.0 to 10.0 mSv and in 30 cases it did not reach 5.0 mSv. The result was communicated as soon as possible (mostly within 24 hours) to the applicant, usually a genetic consultation clinic.

The system of rendering assistance and special medical assistance to persons irradiated during radiation accidents continued to be assured. As part of this the health service section ("traumatological plan") of the in-house emergency plan of NPPs Dukovany and Temelín was assessed. Attention was still paid to the issue of iodine prevention including the assurance of active participation in working meetings. In co-operation with the Clinic of Occupational Diseases of the General Teaching Hospital Prague, the inspection component of the State Office for Nuclear Safety and the Department of Internal Irradiation Monitoring of the State Institute for Radiation Protection, the case of internal contamination by radionuclide Am-241 of the personnel of the Nuclear Research Institute Řež was resolved and published by 2001.

There were repeated meetings with the Chief Health Officer's Department of the Czech Ministry of Health particularly concerning work risk evaluation (including the evaluation of the results of chromosomal aberration of lymphocytes of peripheral blood of the personnel with radiation sources) and the evaluation of natural radionuclide content in drinking water; special attention was paid to a new approach of the WHO to the evaluation of the chemical toxicity of uranium. Other co-operation with the Czech Ministry of Health concerned the field of radiopharmaceutical registration, research which applies ionizing radiation sources and emergency readiness.

The personnel of the exposure control staff also gave attention to informing the public on the issue of the biological effects of ionizing radiation (e.g. meetings with the population residing near shaft Barré near Kladno).

3.8 Central registers and databases formed in radiation protection

Over the course of 1997 - 2002 the the radiation protection section of the State Office for Nuclear Safety developed management tools for the state records systems as stipulated by Act No. 13/2002 Coll. (the Atomic Act). This concerns the central evidence (registers) of professional exposures, ionizing radiation sources, permit holders, and the reporting entities and population exposure in the application of ionizing radiation sources in medicine as well as population exposure due to natural radiation sources.

3.8.1 Central Registry of Occupational Exposure

This registry is presently fully and routinely utilised at the workplace of the State Office for Nuclear Safety in Prague. The registry includes data processing tools from particular suppliers designed for updating their own database. The registry enables information retrieval on recorded personnel, collective information sorted by particular workplaces or professional groups, and collective information in summary statistical outputs according to selected parameters. The records are kept in compliance with legislative requirements for personal data protection. In 2002 the records were

extended with the records of radiation ID cards issued to external personnel. The registry is available on the internal pages of the State Office for Nuclear Safety.

3.8.2 Registry of ionizing radiation sources

Since 2000 this application has routinely operated, including regional centers of the State Office for Nuclear Safety. It enables the retrieval and display of historical data on recorded sources and includes administrative tools of the scope of separate sealed radionuclide sources, as well as the facilities containing the sources and ionizing radiation generators. It is continuing to develop, and the registry will also include the records and evaluation of long-term stability tests. The data required from permit holders into the state record system are the subject of the annex to decree No. 307/2002 Coll. The State Office for Nuclear Safety distributes registration cards of particular types of the sources for reporting purposes. From 2002, those holders permitted to import, export, distribute and produce sources have been under obligation to send the summaries of the sources distributed by them to the State Office for Nuclear Safety twice a year. These summaries are subsequently used to inspect the completeness of the central records of ionizing radiation sources. From 2002, data from the registry of sources concerning the location of radionuclide sources have also been provided for the purposes of the Rescue fire brigade.

3.8.3 Registry of Permit Holders and Reporting Entities

In 2000 implementation commenced of the Registry of Permit Holders and Reporting Entities as an integrating tool of the registeries operating at the State Office for Nuclear Safety. The Central Registry of Occupational Exposure and the Registry of Ionizing Radiation Sources are connected to the Registry of Permit Holders and Reporting Entities as are the Registry of Nuclear Materials and the Registry of Decisions. The Registry of the data on executed inspections is now in preparation.

3.8.4 Central database of medical exposure

This database is created from data provided by the General Health Insurance Company based on the application of the State Office for Nuclear Safety and is kept separately without a link to the above registers. The processing of the data provided by the General Health Insurance Company makes it possible to detect frequencies of particular types of examinations in the fields of X-ray diagnostics and nuclear medicine for selected age groups of patients and also depending on their sex. In case of nuclear medicine, the quantity of applied pharmaceutical can be assigned to each examination. The last period of processed data is 1998 -1999. The data are anonymous as per persons and workplaces.

3.9 Radioactive waste management

3.9.1 NPP Dukovany

The State Office for Nuclear Safety approved a change in the time schedule for adopting conditioning technology for sludge and ion exchangers. The deadline remains unchanged. The limits and conditions of radioactive waste management were met.

3.9.2 NPP Temelín

Based on the detection that NPP Temelín exceeded tjhe limit and conditions of radioactive waste management – exceeding the volume of stored liquid radioactive waste, the State Office for Nuclear Safety issued a decision of corrective action in order to prevent this event's repetition. Technical and organisational measures taken were sufficient, as was confirmed by the inspection. The State Office for Nuclear Safety approved the limits and conditions of radioactive waste management based on submitted safety analyses.

3.9.3 Nuclear facility / repository Dukovany

Based on the requirement of the Administration of Radioactive Waste Repositories, the State Office for Nuclear Safety issued a permit to operate nuclear facility / repository Dukovany, and at the same time approved the limits and conditions of safe operation, Quality assurance programme, In-house emergency plan and a Discarding method proposal for this repository. At the same time the State Office for Nuclear Safety permitted radioactive waste management to the Administration of Radioactive Waste Repositories through placement to the repository Dukovany. This repository is operated in compliance with approved limits and conditions.

3.9.4 Nuclear facility / radioactive waste repository Richard

The Administration of Radioactive Waste Repositories applied for an extension of the permit to operate nuclear facility / repository Richard. The State Office for Nuclear Safety approved the application after its positive assessment under the condition that updated safety analyses of this repository be submitted by 30th September 2003.

3.9.5 Other workplaces

The State Office for Nuclear Safety extended the permit to manage radioactive waste by 31st December 2003 for company ISOTREND, Ltd. In addition, the State Office for Nuclear Safety, based on the application and a positive assessment of the required documentation, issued a permit to manage radioactive waste to ÚJP Zbraslav, a.s., in the scope and method including collection, sorting, gathering, treatment, storage and transport of radioactive waste with a natural radionuclide content. Based on the results of the inspection, the State Office for Nuclear Safety issued corrective action for the elimination of old radiation loads – bituminisation line and a special sewage to the Nuclear Research Institute Řež, a.s.

3.10 Discharge of radionuclides to environment

3.10.1 Putting nuclear facilities out of operation

Based on a positive assessment of submitted documentation, the State Office for Nuclear Safety in its decision of 21st June 2002 approved the proposal of the method of putting fresh fuel storage of NPP Temelín out of operation.

The State Office for Nuclear Safety, by its decision of 16th December 2002, approved a revised proposal of the method of putting training reactor VR-1 VRABEC out of operation of the Czech Technical University of Technology, Nuclear Engineering Faculty, Department of nuclear reactors seated at Praha 8 (the applicant).

Chapter 19 of section III of the Final safety analysis report of reactor LVR-15 of the Nuclear Research Institute Řež a.s., on putting a research nuclear facility out of operation, was assessed with a positive result.

Chapter 15 of the Final safety analysis report of spent fuel storage of NPP Dukovany, on the concept of safe operation cessation and de-operationalising a permitted facility including radioactive waste disposal, was positively assessed.

3.10.2 Putting uranium-mining industry workplaces out of operation

In compliance with the permit of the State Office for Nuclear Safety to de-operationalise mine Hamr I through protective closure connected with dismantling of underground, the workplace with a major source of ionizing radiation DIAMO, s. p., o. z. Uranium mining and treatment, Stráž pod Ralskem, as of 30th June 2002, the 2nd stage of de-operationalising was completed. In compliance with the permit, the subject of this stage was the liquidation of the main mine excavations, pits Nos. 1, 2, 3 and 13 through dismantling. On 4th November 2002 the permit holder submitted the final report of de-operationalising the underground of mine Hamr I to the State Office for Nuclear Safety, indicating that the de-operationalising was executed according to approved documentation, during the de-operationalising all conditions stipulated in the decision of the State Office for Nuclear Safety were met as was the observance of the deadline of completion of de-operationalising of both stages. The de-operationalising of a sludge bed of the 2nd stage of buckeying mine DIAMO s. p. o.z. Uranium mining and treatment, Stráž pod Ralskem, proceeded according to the time schedule approved in the relevant decision of the State Office for Nuclear Safety. Activities related to the de-operationalising proceeded both in the legislative and in the technical section. The legislative section included the administrative procedure at the relevant state administrative bodies for the assurance of required permits for controlled flooding of mine Hamr I with sludge bed water, waste water discharge from internal drainage of the sludge bed, feeding radionuclides through mine water into the river Ploučnice and to a change in road construction and drainage system for drawing of sludges and contaminated floor. The implementation of technical work included assurance of operation and maintenance of the sludge bed, withdrawal of sludge bed water for mine field flooding of mine Hamr I, withdrawal and discharge of water from the northern mud-setting pits into the river Ploučnice and the implementation of construction work. From 1st January 2002 to 30th November 2002, 2,570,000 m^3 of free water was re-pumped into mine Hamr I and in the same period 163,000 m^3 of water were discharged into the river Ploučnice. As part of the approval of required documentation for the permit to operate the workplace, the proposal of the de-operationalising method of Sludge bed I Bytíz was approved by the decision of the State Office for Nuclear Safety
On 11th December 2002 the State Office for Nuclear Safety issued the decision permitting the de-operationalising of the sludge beds of the former Chemical uranium milling plant MAPE Mydlovary administered by DIAMO s.p., o.z. the Administration of uranium deposits Příbram, operation of land reclamations and liquidation work Mydlovary. This concerns the workplaces of the 3rd category K I, K III, K IV/D K IV/E, K IV/C2 and K IV/C1Z. The validity of the decision was determined by the end of 2006.

3.10.3 Putting other workplaces out of operation

As part of the approval of required documentation for the workplace operational permit, the State Office for Nuclear Safety also made the decision to approve a revised proposal of the method of de-operationalising radioactive waste repository Dukovany, revision 1 of 25th October 2002.

4. Emergency readiness

For the purpose of assessing the state of emergency readiness of nuclear facilities and other workplaces, in the course of 2002 in total 17 inspections were carried out; 2 of them were executed in emergency alarm training - one at NPP Dukovany (alarm training), one at NPP Temelín, at the workplace of training reactor VR-1 in Nuclear Engineering Faculty of Czech Technical University and at the workplaces of companies Gamalux, s.r.o., Zamservis, a.s., Třinecké železárny, a.s., Artim, s.r.o., ÚJP Praha, a.s., and Bioster, a.s.; four inspections were executed at the workplaces of the branches of DIAMO, s. p., and two inspections at the workplaces of the Administration of Radioactive Waste Repositories as well as in the Nuclear Research Institute Řež, a.s. (one inspection during alarm training). It was detected that the emergency readiness at the inspected workplaces is in compliance with the relevant provisions of Act No. 18/1997 Coll. as amended.

In 2002 the Emergency Coordination Center assessed and approved changes in in-house emergency plans of ČEZ, a.s. - NPP Dukovany, ČEZ, a.s. - NPP Temelín, Nuclear Research Institute Řež, a.s., ÚJP Praha, a.s., the Administration of Radioactive Waste Repositories / Radioactive Waste Repository Dukovany and Radioactive Waste Repository Richard, Nuclear Engineering Faculty of Czech Technical University / training reactor VR-1 and particular branches of DIAMO, s. p.

In 2002 the Emergency Coordination Center of the State Office for Nuclear Safety participated in the evaluation of safety reports of research reactors LVR-15 and LR-0 of the Nuclear Research Institute Řež, a. s., and it prepared the evaluation report to chapter 8.2 of the Preliminary safety analysis report of spent fuel storage of NPP Dukovany. The Emergency Coordination Center co-operated in the preparation of the standpoint of the State Office for Nuclear Safety to the proposals of the ring road around Prague with regard to its location into the surroundings of the Nuclear Research Institute Řež, a.s. and it also contributed to the preparation of the draft National report of the Czech Republic for the purposes of the Common Convention on safety in spent fuel management and on safety in radioactive waste management.

The State Office for Nuclear Safety, pursuant to government resolution No. 478/2001 adopting document ”Assurance and renewal of the nationwide radiation monitoring network“, commenced work on this renewal and assurance of activities in 2002. Through the Emergency Coordination Center it completed preparation of a decree of the State Office for Nuclear Safety on the function and organisation of the nationwide monitoring network, i.e. decree No. 319/2002 Coll.

The State Office for Nuclear Safety through the Emergency Coordination Center actively participated in all meetings and work related to performance or updating the

provisions of external emergency plan both for the emergency planning zone of NPP Dukovany and for the emergency planning zone of NPP Temelín, to which the State Office for Nuclear Safety was invited.

The Emergency Coordination Center which, by virtue of Act No. 240/2000 Coll. as amended, serves as the emergency management workplace, assures among others the engineering and organisational support to the Emergency Headquarters of the State Office for Nuclear Safety. Thus in course of 2002 the Emergency Coordination Center organised participation of the Emergency Headquarters of the State Office for Nuclear Safety in emergency alarm trainings and partial drills. This particularly concerned the participation in co-operation training Zone 2002 focused on the drill of the measures according to external emergency plan of the emergency planning zone of NPP Temelín and organised by the Ministry of the Interior / Rescue Fire Brigade Headquarters, along with participation in emergency alarm training Vysočina 2002 held in compliance with the relevant provision of decree of the State Office for Nuclear Safety No. 318/2002 Coll. and according to an approved in-house emergency plan by NPP Dukovany. The Emergency Headquarters implemented partial drills according to the scenario prepared by the Emergency Coordination Center; in particular organisational links within the headquarters were trained for the purpose of adopting instructions of particular members. Following the experience acquired in these trainings and drills, the instructions of members of the Emergency Headquarters were continuously amended. The Emergency Coordination Center assured the equipment of the Emergency Headquarters of the State Office for Nuclear Safety with emergency mobile telephones and proceeded with the preparation and assurance of other member training of all expert groups of the Emergency Headquarters of the State Office for Nuclear Safety when not only familiarisation proceeded with a new engineering facility designed for the needs of the Emergency Headquarters and with the relevant instructions, but also the individual preparation of members of the expert groups of the Emergency Headquarters commenced in order to master the program applications available in the Emergency Coordination Center for the needs of the Emergency Headquarters.

The Emergency Headquarters of the State Office for Nuclear Safety actively participated in safety preparation and assurance during the NATO summit held in Prague in November 2002.

In addition, the Emergency Coordination Center, in the field of emergency management, continued work on particular sections of the emergency plan of the State Office for Nuclear Safety, in particular the issue was drawn up of a radiation monitoring network and a reserve workplace of the State Office for Nuclear Safety. At the end of 2002, a new organisational structure of the Emergency Headquarters was prepared and approved following the evaluation of the existing planning system and performance of services of the Emergency Headquarters.

As per engineering facilities of the workplace of emergency management, work on the construction of a separate network of the Emergency Coordination Center, independent of the network of the State Office for Nuclear Safety, was completed along with the adoption of relevant safety rules. In the course of the year, the agreed data transmissions from both nuclear power plants were implemented, and the

database for data storage from NPP Temelín was inspected. A direct data transmission from the Czech Institute for Hydrometeorology was newly commenced.

The representatives of the State Office for Nuclear Safety participated in the work of the Central Emergency Headquarters, and the staff of the Emergency Coordination Center actively participated in the work within the relevant emergency management bodies of the Czech Republic (in particular within the Committee for the civil emergency planning and its ad hoc expert working groups as well as in the expert working groups of Ministry of Defence). The co-operation among many documents proceeded in preparation concerning emergency management of the Czech Republic, and the Emergency Coordination Center assured contributions of the State Office for Nuclear Safety to the evaluation of the knowledge after terrorist attacks against the USA in September 2001 and after floods in August 2002.

The Emergency Coordination Center, in compliance with the Agreement on co-operation between the State Office for Nuclear Safety and the Ministry of the Interior / Rescue Fire Brigade Headquarters of the Czech Republic, on assurance of the transmission and receipt of information in case of the occurrence of extraordinary events important in terms of nuclear safety and radiation protection in the territory of the Czech Republic and abroad, and on operational security of the National alarm point of the Czech Republic by the operational and information center of the Ministry of the Interior / Rescue Fire Brigade Headquarters of the Czech Republic, assured this co-operation. The Emergency Coordination Center in co-operation with the Czech Institute for Hydrometeorology has recently drawn up an Agreement on co-operation between the Czech Institute for Hydrometeorology and the State Office for Nuclear Safety on transmission and receipt of information security in case of the occurrence of extraordinary events important in terms of nuclear safety and radiation protection in the territory of the Czech Republic and abroad signed by both parties in May 2002. The Emergency Coordination Center subsequently assured performance of this agreement by the State Office for Nuclear Safety.

In the course of 2002, a total of 25 foreign trainees were trained at the workplace of the Emergency Coordination Center in the field of emergency readiness, emergency management and radiation monitoring network.

The activities of the Emergency Coordination Center also proceeded in the field of international co-operation; the representatives of the Emergency Coordination Center participated both in international meetings of the users of program EU RODOS and in the training of the users as well as the meetings concerning system EU ECURIE. The Emergency Coordination Center also successfully participated in the international test executed between the users of program RODOS. The integration into system ENATOM (the system of the International Atomic Energy Agency designed for the transmission of information on occurrence of radiation breakdown or accident and on the requirements for assurance of the relevant assistance) proceeded through the State Office for Nuclear Safety, and the expert working groups of Ministry of Interior / Rescue Fire Brigade Headquarters of the Czech Republic, and the Emergency Coordination Center assured all necessary contact with the International Atomic Energy Agency.

5. The State Institute for Radiation Protection activities

The State Institute for Radiation Protection (SÚRO) is an organizational state component established by the decision of the chairman of the State Office for Nuclear Safety on May 26, 1995, which became effective on July 1, 1995. The scope of all SÚRO activities is stipulated in detail by a statute dated November 15, 1995. The Institute's basic function is to provide special expertise, methodology, education, information and research which are related to the state administration's role in protection against ionizing radiation in the Czech Republic. The Institute participated significantly in providing the following activities in the year 2002:

- function of a permanent emergency staff ensuring a significant part of the normal and the emergency mode operation in the Czech Republic's Radiation Monitoring Network (RMS);
- population protection by monitoring and controlling irradiation exposure from natural sources, including providing the Radon Programme;
- population protection against exposure from artificial radionuclides in connection to nuclear power engineering;
- evaluation and control of medical exposure in radiodiagnostics and radiotherapy;
- research in the radiation protection field.

The Institute also fulfilled other tasks, which were continuously assigned by the founder.

SÚRO organizational structure

SÚRO's seat is located in Prague 10, Šrobárova on the premises of the National Institute of Public Health. The first part of the new SÚRO premises was finished in Prague, Bartoškova in the year 2002. The Institute has two branches: in Hradec Králové / Piletice, specializing on the problems of radon and natural radionuclides in the environment, and in Ostrava, specializing on radiodiagnostics.
The internal structure of the Institute is divided into four basic divisions, in compliance with the main activities:

- the Monitoring Division covers two spheres - problems of artificial radionuclides in the environment in connection to nuclear facility operations and problems of internal contamination. The division has a significant role in the operations of RMS in the Czech Republic.
- the Medical Exposure Division covers problems in radiodiagnostics and radiotherapy, coordinates all activities of the X-ray laboratories in Prague and Ostrava, a thermoluminescent dosimetry (TLD) laboratory, TLD network operation within RMS in the Czech Republic, and other special laboratory and in-situ measurements of dosimetric quantities.
- the Natural Sources Division concentrates on the population exposed to natural radiation, particularly the problems of radon and other natural radionuclides, and radiation hazard evaluation.
- the Information System Division ensures data flow, RMS data station and the processing and presentation of data acquired by RMS, the Early Warning System (SVZ) operation on both the local stations (MM) level and particularly on the center level, and the operation of mobile teams for ground and air monitoring. Furthermore the division ensures operation of a LAN network and SÚRO hardware and software.

The detailed description of all SÚRO activities, including a results overview, is presented every year in the annual Report of the State Institute for Radiation Protection activities and in cooperation with SÚJB, in the annual Reports on the Radiation situation on the territory of the Czech Republic, as well as in the annual Report on the Radon Programme fulfillment and in Report on institutional research fulfillment and results. We state a brief informative abstract from these activities in this annual report only; the SÚRO activity within the Czech Republic RMS we describe in more detail.

5.1 The Institute's activities within the statewide radiation monitoring network in the Czech Republic

The legislative frame for the radiation protection system, together with the appropriate executive regulations, form the Law No. 18/1997 of Coll. of peaceful nuclear energy and ionizing radiation utilization and of the revision and addition of some laws in the version of the Law No. 13/2002 of Coll.. Furthermore they form the Law No. 258/2000 of Coll. of public health protection and of the revision of some relating laws in the version of subsequent regulations and the Law No. 2/1969 of Coll. of the Czech Republic government ministries and other central organs establishment in the version of subsequent regulations, which also define the state assignments in the radiation protection system. These assignments are listed in the SÚJB authorities and obligations and in the assignments specified for its special base activity - for the State Institute for Radiation Protection.

The radiation situation is monitored in the scope of RMS assignments, the function and organization of which is confirmed in the State Office for Nuclear Safety Edict no. 319/2002Sb from June 13, 2002. RMS operates in two modes; in normal mode, which concentrates on monitoring in a normal radiation situation and in emergency mode, which the RMS uses during a radiation emergency situation. The RMS permanent staff continuously ensures a normal mode. In the emergency mode the emergency staff works as well. During the normal radiation situation, monitoring is performed by several subsystems, which can be divided into six groups:

- an Early Warning System (SVZ) consisting of 54 measuring points with automated transfer of measured values. Their operation is ensured by the SÚJB Regional Centers (RC), SÚRO, the Czech Institute for Hydrometeorology (ČHMÚ) and the CR Fire Brigade (HZS);
- a network of 14 permanent stations of the Army of the Czech Republic, which performs PDE one-shot measurements twice a day in the normal radiation situation and sends the results into a RMS central database regularly. In accordance with the SÚJB requirements it shifts into intense mode during emergency situations. The measuring points system, which is put into operation on the SÚJB requirement during the emergency situation as well, follows the permanent points operation;
- a territorial network (TLD network) of 184 measuring points provided with thermoluminescent dosimeters operated by SÚRO and RC SÚJB,
- TLD local networks with 92 stations in the area surrounding Dukovany NPP and Temelín NPP operated partly by the Laboratories for Environment Radiation Monitoring (LRKO) of nuclear power plants and partly by SÚRO and relevant RC SÚJB,

- a territorial network of 11 stations of air contamination (MMKO) operated by RC SÚJB, NPP LRKO (there are 6 stations in the area of Dukovany NPP forming one MMKO and 8 stations in the surrounding of Temelín NPP forming one MMKO), SÚRO and the National Authority for Nuclear, Chemical and Biological Protection (SÚJCHBO).
- a 9 laboratory network (laboratories in RC SÚJB, Dukovany NPP LRKO, Temelín NPP LRKO and SÚRO laboratories), most of which are equipped for gammaspectrometric and radiochemical analyses of radionuclides content in samples from the environment (aerosols, fallouts, foodstuff, drinking water, feed etc.).

The mobile team (SÚRO, RC SÚJB, the Ministry of Interior Departments and the Ministry of Finance Departments, Dukovany NPP and Temelín NPP operators) is a significant part of the Radiation monitoring network. The SÚRO mobile team professionally ensures general monitoring of the radiation situation, especially:

- mapping the radiation situation on the basis of automated aerial or ground exploration,
- thermoluminescent dosimeter distribution, placement and transport,
- qualitative and quantitative determination of radioactive substances content in the field,
- aerosol samples for filters in order to determine the activity concentration of radionuclides in the atmosphere,
- samples from the environment (soil, plants, foodstuff, water and other materials),
- search for ionizing radiation sources which occur illegally in the environment.

The monitoring results for the year 2001 have been submitted, as every year, in the annual Report on the radiation situation on the territory of the Czech Republic to the central organs and to the public through county councils, hygienic stations, libraries and SÚRO web pages (www.suro.cz); the monitoring results for the year 2002 will be published and reproduced during the first term of the year 2003 in the same way.

5.1.1 Artificial radionuclide monitoring in the environment

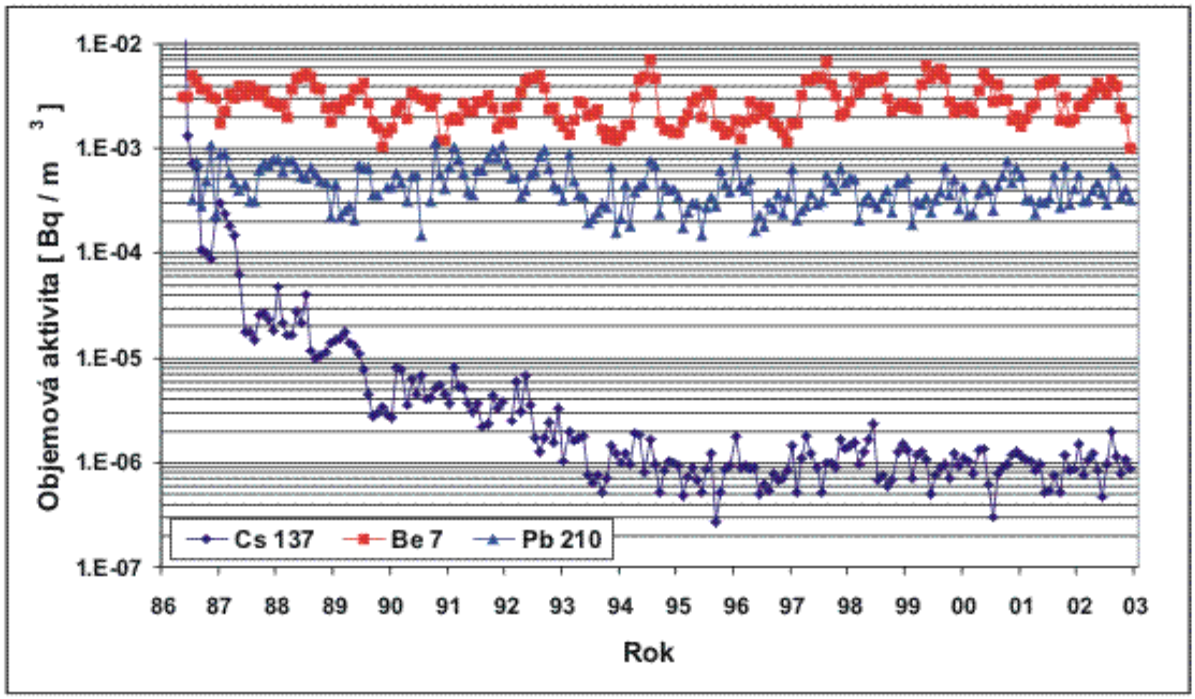
The purpose of the monitoring program is to monitor the distribution of radionuclide activity and ionizing radiation doses on the territory of the Czech Republic over space and time; particularly to obtain long-term trends and to determine their deviation in time. Attention is paid to the artificial radionuclides, out of which the following occur in measurable values and are monitored by the RMS: ^{137}Cs, ^{90}Sr, $^{239+240}$Pu, ^{85}Kr in the air, ^{137}Cs, ^{90}Sr, ^{3}H in foodstuffs and ^{137}Cs in the human body.

5.1.1.1 Air contamination

There were no serious deviations in the artificial radionuclide content in the air during the year 2002 nor in the previous period. The activity concentration of the radionuclide ^{137}Cs in aerosol, which comes mainly from the higher levels of the atmosphere and from the resuspension of the original fallout on the ground surface, are of μBq/m^3 at most. A part of the ^{137}Cs activity in the air is from the global fallout from nuclear weapon tests in the atmosphere and another part from the Chernobyl NPP accident. Samplers for aerosol sampling from the air with the air flow of 900 m^3/hour are shown on Fig.1.

Besides the ^{137}Cs the ^{7}Be also occurs in aerosols, which is of cosmogenic origin, and the ^{210}Pb, which is the product of the ^{222}Rn transformation. All the given radionuclides are determined in aerosols and fallouts by semiconductor gamma spectrometry. As an example, the time course of the monthly mean activity concentration of ^{137}Cs, ^{7}Be and ^{210}Pb in the air aerosol and the time course of the monthly mean activity area of the same radionuclides in fallout in the way it has been monitored since the year 1986 at MMKO SÚRO in Prague (Fig. 2 and 3). The long-term, currently very slow, decrease of the activity concentration of ^{137}Cs and also seasonal variation of the content of ^{7}Be during the year is apparent. The weekly mean values of the ^{137}Cs activity concentration measured at MMKO in Prague in the year 2002 are shown in Figure 4.

Fig. 2. Monthly mean values of selected radionuclide activity concentration in the air aerosol - MMKO SÚRO in Prague



Legend: *Objemová aktivita - Activity concentration*
Rok - Year

Note: The year corresponds to the beginning of the given year in this and in the following tables

Fig.3. Monthly values of the activity area in the fallout - MMKO SÚRO in Prague

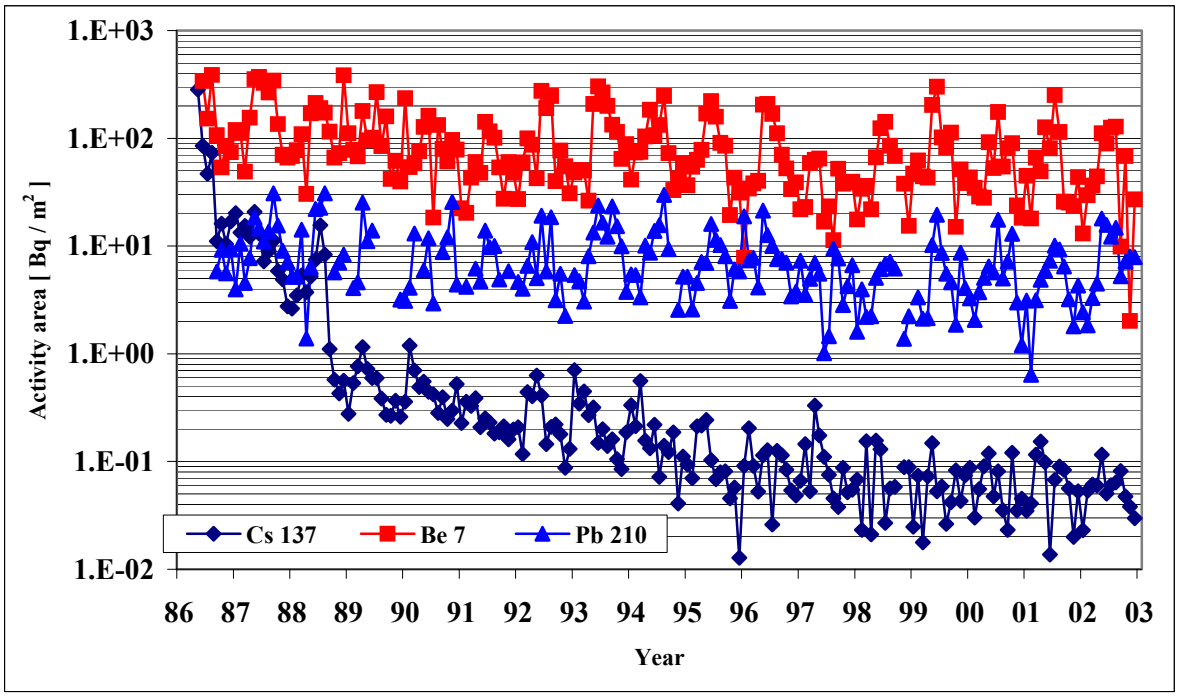
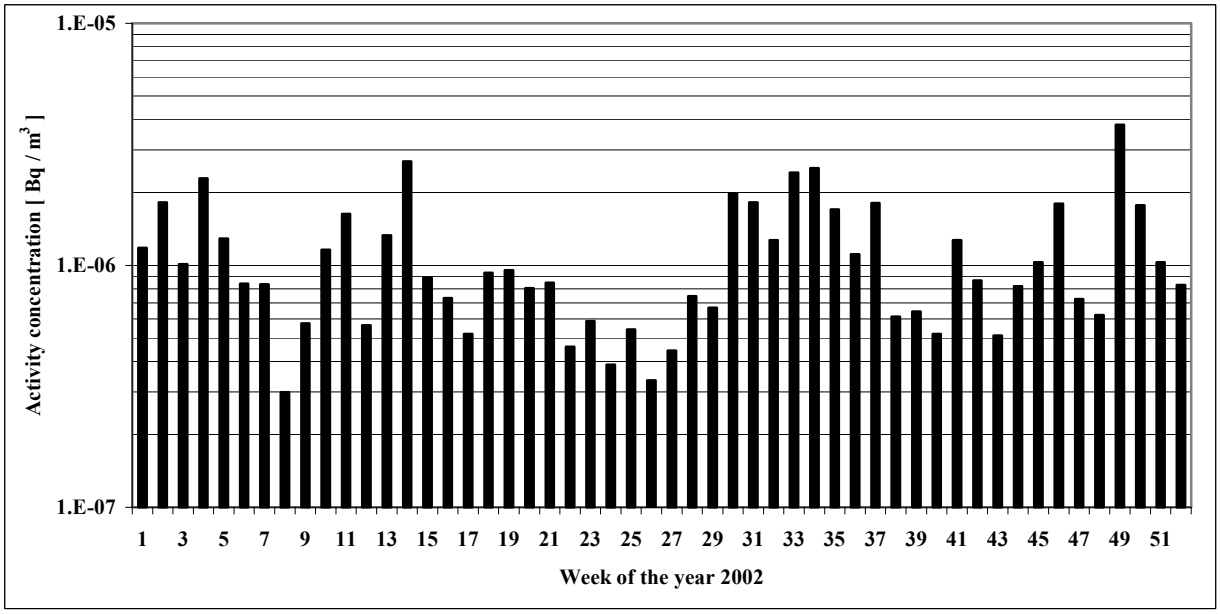
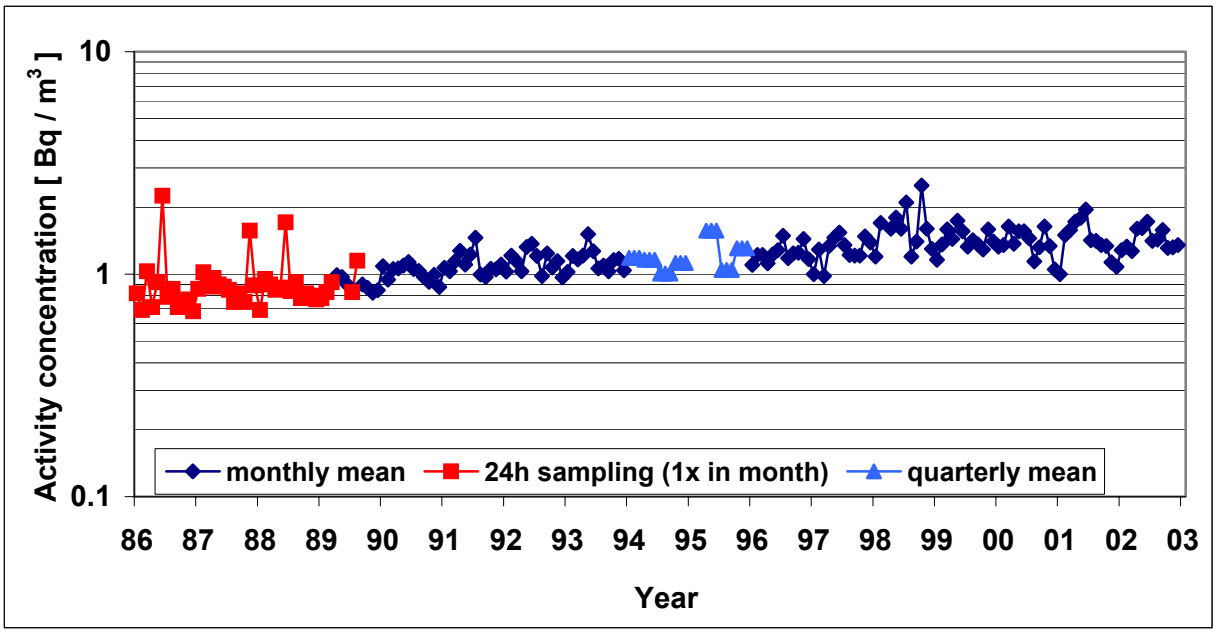


Fig. 4. Weekly values of the activity concentration of ^{137}Cs in the air aerosol in the year 2002 – MMKO SÚRO in Prague



Monitoring of ^{85}Kr has been included in the system of monitoring of the radionuclide content in the air performed by RMS in the year 1996 to gradually introduce monitoring of all artificial radionuclides which can be detected in the environment. Krypton 85 is a fission product and occurs also in small amounts in the outlets from nuclear power plants. However the main sources of ^{85}Kr are plants for nuclear fuel reprocessing and nuclear warfare tests in the past. The measurement of the activity concentration of ^{85}Kr continued in the monitoring performed by the Radiation Dosimetry Institute of ČAV. The measurements are always performed in the same place on the premises of the present-day Radiation Dosimetry Department of the Nuclear Physics Institute of ČAV in Prague 8. The time course of the activity concentration of ^{85}Kr since the year 1986 is given on Fig. 5.

Fig. 5. The activity concentration of ^{85}Kr in the air, samples and measurement on the premises of the Radiation Dosimetry Department of ÚJF ČAV in Prague 8 – Bulovka



5.1.1.2 Foodstuff contamination

Foodstuff contamination with radionuclides is monitored in samples taken and evaluated in accordance with the long-term monitoring plan. This plan is determined for individual commodities, particularly according to the extent of their consumption. Forasmuch as there was no emergency event in the year 2002 which would cause an increase in the radionuclide content in the environment, no increase of foodstuff contamination with such substances occurred.

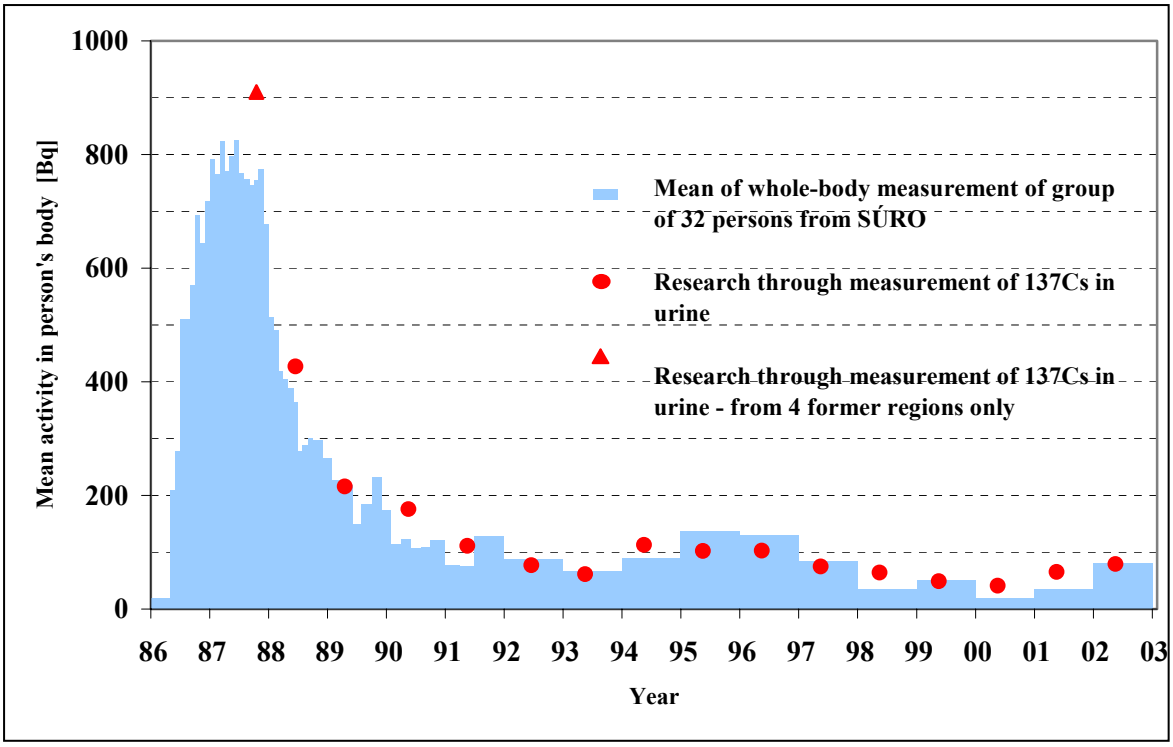
The activity mass or concentration of ^{137}Cs in some basic foodstuffs - milk, beef and pork - is in hundredths to tenths of Bq/kg, respectively of Bq/l. The activity concentration of ^{137}Cs and ^{90}Sr in drinking water is very low (tenths to ones of mBq/l), possibly under the detectable limit. The tritium content in drinking water is in ones of Bq/l and is systematically decreasing over the years in the long term.

Every year the increased content of ^{137}Cs in mushrooms, forest fruits and wild animal meat attracts public attention. The values of activity mass of ^{137}Cs in these products reach ones to hundredths of Bq/kg. The decrease of ^{137}Cs activity is very slow in these products; it is given by the ecosystem. With respect to relatively higher activity of these products (in comparison to other kinds of foodstuff) the contribution to the total assignment of the effective dose from ^{137}Cs ingestion is higher in spite of their low consumption (in comparison to other types of foodstuffs); however in comparison to the exposure from natural resources completely insignificant (less than 0,1%).

5.1.1.3 Human internal contamination

The monitoring of ^{137}Cs internal contamination in persons' bodies continues on the SÚRO whole-body counter in Prague. The group of 32 persons (17 men, 15 women) participated in the monitoring in the year 2002, mainly Prague inhabitants in the age between 21 and 63 years.

Fig. 6. The development of ^{137}Cs content for the Czech population after the accident in Chernobyl



With respect to the very low content of ^{137}Cs in the population, the whole-body measurement is performed once a year only, while a long measurement period is used to reach the lowest limit of detectability. The mean activity of ^{137}Cs in the body of one person, determined on the base of these measurements, was 80 Bq. The statewide survey was performed as in previous years to ascertain the internal

contamination of ^{137}Cs through the measurement of the ^{137}Cs activity excreted in urine in 24 hours. The samples were taken in May to September 2002 from 28 women and 40 men in total, who roughly represent our population with their food habits. The mean value of the ^{137}Cs activity, excreted in urine in 24 hours, was 0,48 Bq and the recalculated mean content (retention) of ^{137}Cs activity in the body corresponding to it was 79 Bq. A very low increase of the mean activity in the human body was explained with the changes in the origin of consumed foodstuffs and with the changes in food habits.

5.1.2 Monitoring of external exposure

5.1.2.1 Monitoring through TL dosimeters network

The results of monitoring from the territorial TLD network for the year 2002 are given in the table. The several-years measurements in territorial TLD network confirm its capability to record possible significant deviations from the normal situation in a given locality. The results from the local TLD networks for the year 2002 will be given in more detail in the Report on the radiation situation on the territory of the Czech Republic in the year 2002.

Table: Quarterly means of H_x (nSv/hod) photon dose equivalent rate determined by the thermoluminescent dosimeters territorial network on the territory of the Czech Republic in the year 2002

Stations area	Prague SÚRO	Middle Bohemia SÚRO	South Bohemia SÚRO/RC Č. Budějovice	West Bohemia SÚRO/RC Plzeň
Number of MB	13	25	30	25
	$H_x \pm s$	$H_x \pm s$	$H_x \pm s$	$H_x \pm s$
I/02	121 ± 16	136 ± 47	135 ± 22	122 ± 22
II/02	124 ± 15	139 ± 42	149 ± 21	131 ± 18
III/02	123 ± 13	128 ± 33	142 ± 25	130 ± 20
IV/02	118 ± 12	132 ± 38	154 ± 20	124 ± 21
Stations area	North Bohemia SÚRO/RC Ústí nad Lab.	East Bohemia SÚRO/RC Hradec Kr.	South Moravia SÚRO/RC Brno	North Moravia SÚRO/RC Ostrava
Number of MB	23	21	26	21
	$H_x \pm s$	$H_x \pm s$	$H_x \pm s$	$H_x \pm s$
I/02	108 ± 28	111 ± 32	117 ± 19	101 ± 13
II/02	115 ± 31	108 ± 32	121 ± 23	115 ± 13
III/02	117 ± 29	121 ± 31	124 ± 20	111 ± 16
IV/02	121 ± 33	124 ± 33	125 ± 24	117 ± 13

Notes : H_X - mean value, s - standard deviation
when specifying the station the SÚRO/RC items indicate that the SÚRO is performing the measurements and results evaluation, RC ensures the dosimeters distribution and transport
MB – monitoring point

5.1.2.2 Monitoring through the Early Warning System (SVZ)

The measurement of photon dose equivalent rate (PFDE) runs continuously in the SVZ, mean values are measured in 10 minutes. The acquired values are put on RMS centers in SÚRO and on SÚJB Emergency Coordination Center into the RMS information system central database every hour; this is done from 9 measuring points placed in RC SÚJB and in SÚRO through SMS messages of the Global System for Mobile Communication and from 38 measuring points on the ČHMÚ centers through the ČHMÚ communication network into its central computer as well as through dedicated data circuits into the RMS information system centers. If necessary the intervals for data transmission are shortened to a half-hour. Data from 7 SVZ measuring points operated by HZS are transmitted on diskettes for the present.

Data transmitted from MM in the centers are continuously processed and evaluated; should the adjusted PFDE values level be exceeded, the SVZ center duty employee is immediately informed through SMS messages of the Global System for Mobile Communication. This employee then evaluates the radiation situation and if the measured values can be justified neither by the fluctuations of the natural background, nor by the technical fault of the instrument, nor by the fault of the MM operator, he notifies the SÚJB Emergency Headquarters of the possible emergency.

5.2 SÚRO - other activities

The Information Systems Division, in addition to fulfilling the RMS extensive assignments mentioned above, also provides the SÚRO mobile team (MS) activity, which participated in routine RMS activity in the year 2002 by TL dosimeters quarterly transport and distribution and by the measurement of photon dose equivalent rate (PFDE) in a route.

On SÚJB initiative MS SÚRO participated in the check and comparative measurements in the areas surrounding the DIAMO Mydlovary sludge tanks. The event, which took place on March 1, 2002, was widely publicized taking into consideration the participation of SÚJB representatives, DIAMO employees and Austrian and Czech activists. The MS SÚRO function was to perform the comparative measurements of PFDE in monitoring points, concurrently with employees from the radiation protection group of the Research Center from Seibersdorf. The event was related to a meeting of experts from Austria and the Czech Republic within the information day, which was held on the premises of the DIAMO Mydlovary on April 20, 2001. The MS SÚRO participated in this event as well in the comparative measurements with the laboratory in Seibersdorf. There the in-situ PFDE measurements and the laboratory measurements were performed of the artificial radionuclide specific activities in the soil and water samples from the area surrounding the sludge places. The comparison of obtained results corresponded very well, however was never published.

The mobile team also participated in the all-European common practices of the ground and air MS in Scotland and of the ground MS in Hungary, which were focused on the comparison and harmonization of methodology used and measuring procedures.

In 2002 the mobile team participated in providing protection of the officials and population during the NATO summit held in Prague. Nine employees from the mobile

team attended this event. First there was an air measurement of the dose rates over the area of the summit place in case of the necessity to seek out radiation sources. Two employees assisted from Saturday November 16 until Monday November 18 while providing safety in the Congressional Center (they measured the dose rates in all premises), then six employees were on alert from November 17 until November 23 for 24 hours, at first in the SÚRO building, later directly in the Congressional Center while a few SÚRO employees ensured safety in the places of the summit events outside the Congressional Center (Slovanský dům, Hrzánský palác).

The Monitoring Division participated in RMS management in sampling and samples analyses and the processing and presentation of acquired data.

The emergency preparedness of the division was verified during the practices organized by SÚJB and in particular during the NATO summit in Prague, when the division provided the laboratory base to the mobile teams and some employees attended the activities in mobile teams while providing safety for the session participants, namely seeking out sources of ionizing radiation before the session as well as during the session.

The division, within NPP selective monitoring, carried out

- inert gas samples from Dukovany NPP, Temelín NPP and ÚJV Řež ventilation stacks, where ^{85}Kr was assessed as well as the nuclides identifiable by gammaspectrometry;
- the assessment of transuranic radionuclides (^{238}Pu, $^{239+240}Pu$, ^{241}Am, ^{242}Cm, ^{244}Cm) in the aerosol samples from the Dukovany NPP and Temelín NPP ventilation stacks;
- aerosol samples in cooperation with NPP Temelín employees from the Unit 1 ventilation stack using the cascade impactor, their measuring and analyses to find out the aerosol size composition.

In the year 2002 case studies continued of persons contaminated with ^{241}Am, which occurred in July 2001 in ÚJV Řež in connection with the abandonment of hermetic glove cabinets, in which the powdery AmO_2 used for the production of fire alarm sources had been processed for more than 20 years. The report on measurement methods and estimation of the committed effective doses of ^{241}Am, called "Estimation of the committed effective doses from occupational intakes of ^{241}Am", was given to SÚJB in February 2002, which was then part of a SÚJB report to international organizations. Other experimental data of excretion were acquired during the year, which allowed more variations in the models usage. Twenty-eight analyses of urine and 19 analyses of stool were performed altogether with this group in the year 2002. In most cases better correspondence was reached between the measured data and courses calculated using the combination of inhalant and ingestion intake, which results in the decrease of the committed effective dose, because the dose coefficient for ingestion is about two grades lower than that for inhalation. In some cases it is obvious that the ^{241}Am intakes were repeated, which again leads to estimations decrease. On the other hand this finding is alarming.

Fourteen analyses of aerosol samples from different parts of buildings where ^{241}Am was treated, were performed in the connection with this case in the year 2002. One sample was also taken using the cascade impactor to find out ^{241}Am elements size

separation. Altogether more than 160 analyses were performed in connection with this accident.
As per other task fulfillments assigned by the founder

- processed expert documentation for SÚJB inspection on ZIZ usage (e.g. elaborated opinions of methodology and operating procedures submitted by the subjects requiring authorization);
- prepared expert documentation for legislative documents and developed standpoints to legislative documents; in particular participated in preparation of the Edict 319/2002 of Coll. of RMS, to which it developed also 21 methodologies for sampling and analyses;
- assessed some artificial radionuclides in the formulas of building materials and waters and monitored the surroundings of the DIAMO Mydlovary sludge tanks.

For other subjects the division

- performed more than 700 radiochemical and gammaspectrometric assessments within the contract with the Administration of Radioactive Waste Repositories (SÚRAO);
- upon order performed a number of radionuclide activity assessment in building materials, in the specimen from radiotherapeutic sources of radiation, in the foodstuffs designated for export, and in the waters and the assessment of internal contamination in the body of employees with ZIZ on the whole-body counter.
- The division attended to support to those affected by the floods from last August, in particular to the Nuclear Research Institute (ÚJV) in Řež, for which the employees provided measurement on whole-body counter, the wastewater measurement and measurement of water from flooded buildings.

In the training, educational and information area the division participated in an educational program, particularly for the students of FJFI ČVUT in Prague and for SÚJB employees. In cooperation with SÚJB and IAEA, it provided scholarships for foreign students and provided expert consultations to inspection employees, private enterprises and the public. The division participated significantly in the preparation of the Report on the Radiation situation in the territory of the Czech Republic in the year 2001, in the SÚRO contribution for the annual SÚJB and Ministry of Environment report and in the preparation of documentation for SÚRO internet pages, which updated information on the current radiation situation once a week.

The division employees within other activities participated in

- work in the executive committee of the European network for ALARA principles assertion (European ALARA Network);
- attendance on bilateral meetings negotiations with Austria as part of the agreements from Melk fulfillment;
- attendance on RO5 group work (an informal group of European experts dealing with monitoring aerosols in the air, which is able practically immediately to react and inquire on current activity concentration values through e-mail).

The division participated in several international comparisons as part of QA/QC providing.
In research and development, the division provided a solution to two tasks from the institutional research maintained under the title "Study of the artificial radionuclides in the environment and in the working environment" (in which they made progress particularly in the implementation of equipment for ^{14}C assessment in the

environment and in the NPP outlets) and "Study of radionuclides behavior in humans and the development of a new approach to the estimation of exposure from internal contamination".

The division performed a total of 1800 analyses in 2002 with gamma spectrometry and more than 900 radiochemical analyses with alpha spectrometry, beta measurement and other methods for the assessment.

The medical exposure division also performed, besides the measurement of photon dose equivalent using the TLD within RMS, independent checks (audits) of the radiotherapeutic sources of radiation by in-situ measurement (29 sources of radiation in 16 stations), correspondence TLD audit in the radiotherapy (58 volumes in 18 stations, see Fig. 8) and correspondence TLD audit of dental X-rays (1737 audits, see Fig. 9).

A total of nineteen tests were performed for the type approval of X-rays and radionuclide radiation sources. Thirty-six documents were reviewed altogether by the management during the administration of authorization of the acceptance tests, the long-term stability tests, the operating stability tests and the standards proposals review. The Authorized Metrology Center verified and calibrated the meters in the X-ray laboratory (by August 8, 2002), kVp meters calibration, lead equivalent measurement, radiation over the films for the Statewide service for personal dosimetry and others.

In the institutional research, within the "Study of the Czech Republic population exposure during the sources of ionizing radiation usage for diagnostic and therapeutic purposes", were performed

- audits of therapeutic X-ray devices (11 audits);
- audits of after-loading devices designated for brachytherapy (8 audits);
- correspondence TLD and film audit in the dental radiodiagnostics (1737 audits);
- correspondence TLD audit with multi-purpose phantom utilization (2 audits).

Details are given in the Report on the state of SÚRO institutional research task solutions in the year 2002 and in the Final reports of two partial tasks.

The division employees attended the test for special expert qualification in SÚJB and organized practical parts of tests for special expert qualification verification and comparative measurements of the owners of authorization for skiagraphy.

Methodologies SÚRO 43-1-02 "The measurement of photon dose equivalent through TLD within RMS ČR" and SÚRO 43-1.1-02 "The measurement of photon dose equivalent in the Richard Radioactive Waste Repository locality" were elaborated.

The authorization of SÚRO – K110 metrology center for the verification of determined meters has been invalidated with the effective date of August 8, 2002. This center has been in the possession of the State Institute for Radiation protection, and before its establishment in the possession of the Institute for hygiene and epidemiology, since 1985. The reason for its invalidation was the fulfillment of the ČR government decree dated August 23, 2000 and its attachments in the item 7.3.3 "Transformation of the selected metrology activities from the State Institute for radiation protection on the Czech Metrology Institute" and SÚRO's inability to fulfill Authorized Metrology Center commitments given by law at present, particularly in the personnel protection field.

Fig. 8. TLD audit results in the radiotherapy in the year 2002 – the spectrum of relative deviations Δ_D between the dose measured by TLD and the dose assessed by the station

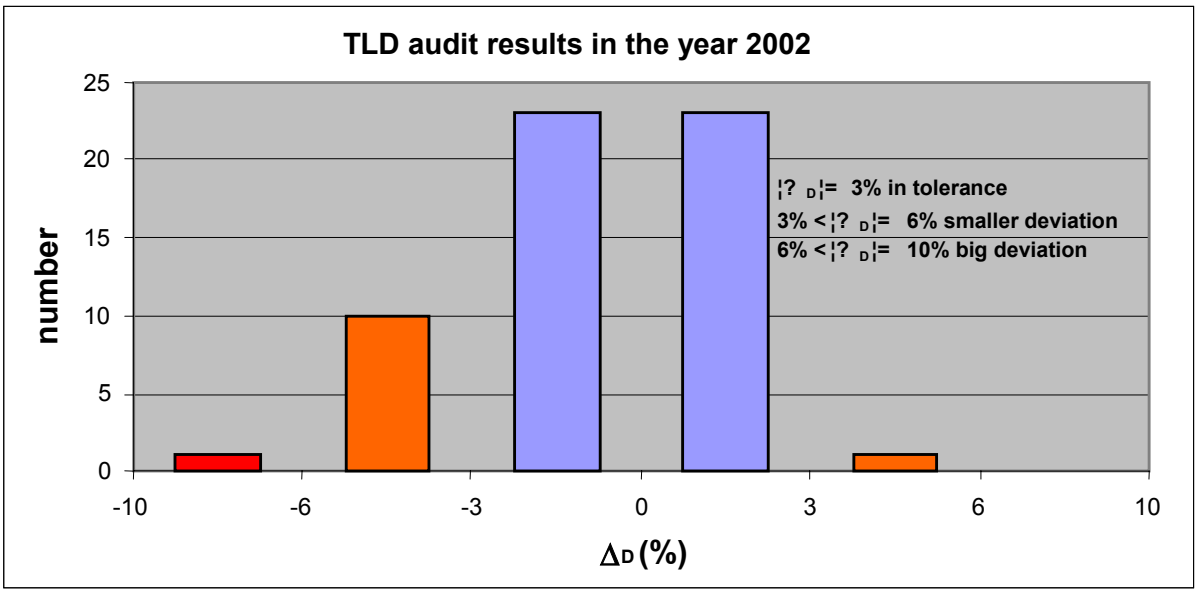
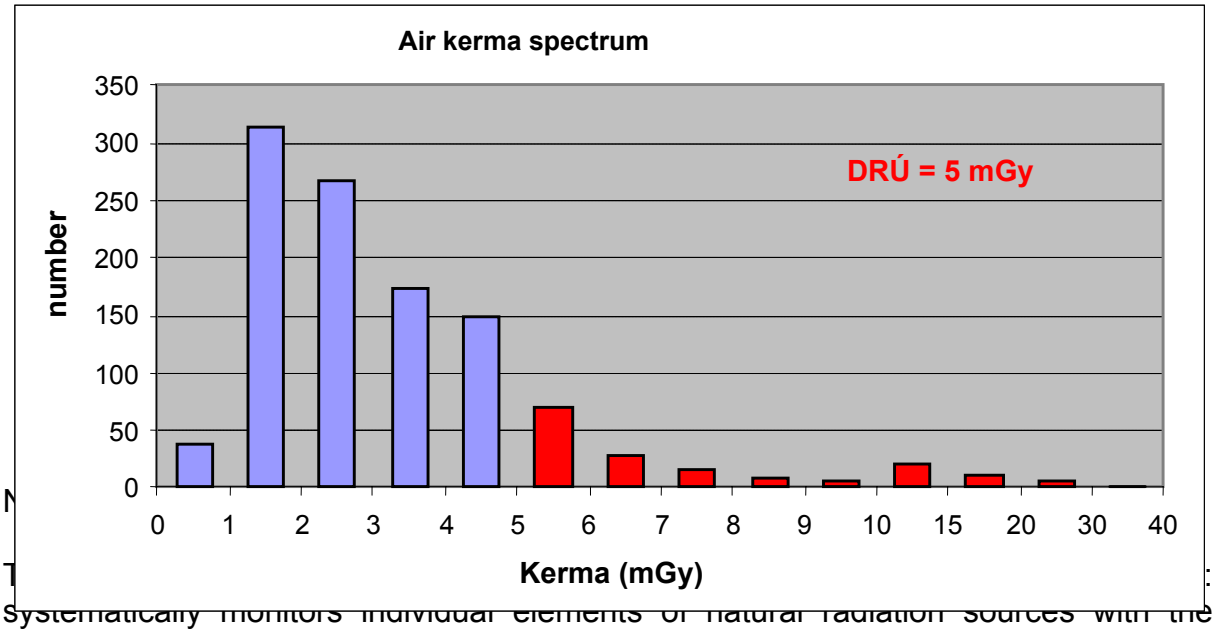


Fig. 9. TLD audit results of dental X-rays in the year 2002 - the spectrum of kerma in the air on the end of the tube (air kerma)



N

T

Systematically monitors individual elements of natural radiation sources with the intent to search for cases or areas with higher levels of natural exposure and its influence on the population and the environment, suggests provisions for a decrease of exposure, monitors their implementation and analyzes their validity and effectiveness, ascertains the natural radionuclide content in the selected commodities

(e.g. in water supplied into the public duct, in building materials etc.), fulfills the tasks assigned by SÚJB within the "Radon program" of the Czech Republic, provides monitoring and evaluating of the risk of illness as a result of ionizing radiation exposure; maintains laboratory and in-situ measurement capacities in such a state as to be possible to assess the natural radionuclide content in environmental elements and on the basis of ascertained data to assess ionizing radiation doses resulting from it, performs statistical processing and maintains databases with natural exposure data, provides education in the natural sources field for SÚJB inspectors and other measurement subjects and prepares and publishes information materials for the public, the Civil Service and the municipal governments (e.g. Radon bulletin), participates in work in the SÚJB test and expert commissions for the natural sources field, cooperates in international work groups, as per the SÚJB requirement elaborates expert opinions, methodologies and proposals for legislative documents in the radiation natural sources field and performs research in the natural sources field. The main results are described briefly in the following text.

The building radon research programme continued searching for buildings with high radon activity concentration in the internal air. Results from another 10841 buildings were acquired within the search program in the year 2002. One thousand seven hundred forty nine buildings altogether were found over the EOAR=200 Bq/m^3 emergency level (corresponds to annual effective dose approximately 10 mSv). The overview of measured number of buildings and of results in individual years is shown in the following table:

Table: Overview of the programme results for the searching of houses with a higher radon hazard

Year	Number of newly measured buildings	Number of buildings, where the REAC was found in given limits (Bq/m^3)			
		> 200	200 – 299	300 – 600	> 600
1998	5634	2014	925	773	316
1999	5257	1171	533	455	183
2000	6760	1570	668	684	218
2001	11546	2150	1107	802	178
2002	10841	1749	850	722	177

Ten thousand three hundred four detectors in total were newly placed (i.e. according to the time of measurement 2002-2003) within the basic research. A lack of finance required for the research (only 3 million CZK were released instead of 8 million CZK planned according to the governmental decree) caused a decrease in the number of detectors placed and restrained the search program.
The data acquisition of measurement results continued in a corresponding way in the anti-radon precaution effectiveness research field, one thousand two hundred forty three results in total were acquired by the end of the year. In cases where the anti-radon precaution failure was found, the radon expert group handled these problems.

The radon expert group primarily concentrated on the research of new radon diagnostic methods and on the study of radon dynamic in the building including new methods of continuous ventilation measurement. The group investigated the cases

when the anti-radon precaution failed using the practice research results. The group performed 9 detailed inquiries in total. The group reviews documentation related to the measurement, the recovery precaution project, the budget, the real invoicing, and performs diagnostic measurement to find out the causes of precaution failure. More and more findings indicate that research information from last three years was not respected during the precaution implementation. Simple and inexpensive checks were proposed and implemented in cooperation with an expert for radon problems in civil engineering, and these resulted in nonfunctional recovery precautions working.

The radiochemical laboratory in Hradec Králové performed, apart from the research assignment fulfillment, the following analyses in the year 2002:

sample type	measured for	number of samples	number of analyses
building material raw material, wastes	producer, importer	79	79
	laboratories	90	90
	others	37	37
	in total	206	206
drinking water	SÚJB – inspection	106	325
	hygiene service	28	84
	SÚRO – IV	406	406
	others	10	50
	in total	550	865
others		77	77
total		833	1148

The radiation hazards evaluation division continued research to solve tasks within the IGA 6768 grant and within the SÚRO Institutional research. The conclusions can be summarized in the following items:

1) Results of a study of uranium mine workers after 50 years from the exposure and the influence of smoking.
The evaluation of long-term radon treatment in the uranium mines after more than 50 years of exposure in the study of 9960 mineworkers is significant not only from the point of view of professional exposure and possible compensation, but also from the point of view of health consequences of radon in homes. Nine hundred twenty two cases of lung carcinoma were observed in the mineworkers' group at the end of the year 1999. Considering the influence of smoking on the risk extent, an extensive examination consisting in smoker's anamnesis completion in the mineworkers group exposed to radon in the fifties and sixties was implemented in the mineworkers' study from the year 2002. On the base of medical records and correspondence with survivors, individual information on smoking was obtained for 332 cases of lung carcinoma and for 502 checked-up persons, selected coincidentally from the origin group regarding their age and year of birth. The combined influence of smoking and radon is consistent with sub-multiplicative interaction: the relative risk coefficient for nonsmokers is approximately twice as high as with smokers.

2) Lung carcinoma compensation in the uranium mines.

The lung carcinoma radiogenic basis in the conditions of long-term exposure in the Czech uranium mines has been evaluated in our country since the year 1962. The causal connection in view of individual exposure monitors new radiobiologic information with one to two years' delay. At the present time the evaluation of lung carcinoma professionalism is based on a model which respects the change of risk with the exposure time and with the age during the exposure.

3) The evaluation of leukemia risks for uranium mine workers.
The leukemia risk from ionizing radiation has been substantiated in many epidemiologic studies. The results of leukemia study in the cohort of almost 10,000 uranium mine workers based on 27 cases monitored at the end of the year 1999 prove a connection with ionizing radiation exposure which is significant from the statistical point of view. The greatest part of this exposure is comprised of uranious dust. Although there are dose estimations for bone marrow, it seems to be a more practical usage of a model based on exposure modified time where the administrative professions are included with half year.

4) The occurrence of malignancy in the surroundings of nuclear power plants.
Descriptive studies completed abroad within the last twenty years proved the existence of clumps of young people with leukemia cases who live nearby some nuclear power plants. Nevertheless this monitoring is not the common rule and the clumps with cases were observed also far away from such facilities. Although analytic studies have been prepared to clarify the cause of such events, and resulted in the refusal of some hypothesis, they still have not provided the final explanation. Many aspects leaded to the abandonment of the hypothesis presupposing a relationship with the fathers' exposure before conception and of the hypothesis presupposing the ionizing radiation exposure in the environment. Other hypothesis are accepted, in particular the hypothesis, which presupposes infectious etiology.

5) Microdosimetric analyses of mammalian cells radiation damage.
Within the SÚRO Institutional research, microdosimetric analyses were performed of an experiment with mammalian cells, which were exposed with alpha elements with energy linear transfer values corresponding to LET values for radon filial products. It was found out on the base of this analysis that the radiosensibility of human bronchial epithelium cells is comparable for heavily alpha ionizing radiation to the radiosensibility of human lymphocytes.

6) Biological dosimetry.
Calibration curves were plotted for reciprocal translocation and dicentric aberration indicated by the FISH method, which was implemented in the Medical genetics division of Thomayer Hospital Faculty in Krč. Calibration curves were used to estimate the radiation load of persons registered in the SÚJB Central register. Results of persons' cytogenetic examination, who were contaminated with ^{241}Am, were studied from the point of view of the equivalent dose calculations in bone marrow.

6. The State Institute for Nuclear, Chemical and Biological Protection activities

The State Institute for Nuclear, Chemical and Biological Protection (SÚJCHBO) was established by the decision of the SÚJB chairman, which became effective on January 1, 2000, as a contributory organization of SÚJB Prague. The Institute has its

seat in Kamenná at Příbram with separate stations in Příbram, Brno and Dolní Rožínce.
The main purpose of the establishment of SÚJCHBO is to monitor and evaluate nuclear, chemical and biological substance impacts on humans and the environment, including the evaluation of a protection grade for individual and collective means for human protection against these substances. Part of this activity is also research and development in this field, fulfillment of assignments in support of inspections performed by SÚJB inspectors and fulfillment of assignments resulting from constitutional law no. 110/1998 of Coll. of the Czech Republic safety and the providing of training and education - all within statewide force.
Determined activity in the SÚJCHBO Statute is developed into the Institute's main assignments, and the organizational structure is consecutively specified while the activity of individual workplaces are determined in an Organizational Code. Particular assignments for the forthcoming period are stated in the "Conception of other SÚJCHBO activities by the year 2005".
Most of the stations of the nuclear, chemical and biological protection divisions are accredited by the Czech Institute for Accreditation (ČIA). During the year 2002 ČIA regular checks took place in the workplaces with positive results.
In SÚJCHBO the Authorized Metrology Center operates which is authorized by the Office for Standardization, Metrology and Testing verification of given meters in accordance with law no. 505/1990 of Coll. in the version of law no. 119/2000 of Coll..
SÚJCHBO expert activity execution is conditioned by, with respect to the character of this activity, the fulfillment of many conditions specified by legislative provisions. Treatment with chemical and biological substances and ionizing radiation is particularly involved.
SÚJCHBO issued the "License for high dangerous substances treatment" in accordance with law no. 19/1997 of Coll. in valid version, and all requirements of the law no. 157/98 of Coll. in the version of law no. 352/1999 of Coll. for ensuring the treatment of dangerous substances and means by an authorized person were met. Authorization was given by the Ministry of Environment of the Czech Republic. The authorization for dangerous wastes treatment was given to SÚJCHBO by the Ministry of Environment of the Czech Republic, in accordance with the law of wastes.
The authorization for high risk and dangerous biological agents and toxins treatment is in the process in accordance with law no. 281/2002 of Coll. in the version of Edict no. 474/2002 of Coll..
In the field of ionizing radiation treatment the performed Institute works were permitted and the workplaces confirmed by relevant SÚJB decisions in accordance with law no. 18/1997 of Coll. in valid version.
Contractual relationships also influence the Institute's activity. In particular the "Cooperation Contract" concluded (on the basis of the Cooperation agreement between SÚJB and MV - GŘ HZS) between MV - General Head Office of HZS ČR and SÚJCHBO is significant, on the basis of which SÚJCHBO is integrated into other components of the Integrated safety system. On the international level it is the contract of cooperation with TNO PML, the Hague, the Netherlands in science and research.
SÚJCHBO organizational structure reflects activities and tasks assigned by the Statute. The expert activity is covered by - as in previous years - the nuclear, chemical and biological protection divisions and a separate division for inspection support. SÚJCHBO operation is ensured by the economic department and by the Institute office. Fifty-four employees (physical persons) were employed in the Institute

on November 31, 2002, which was after the recalculation into full-time jobs of 48,528 employees. SÚJCHBO activity is partially covered from the state budget and partially by profits from expert activities.

6.1 The basic specialization of expert workplaces

The nuclear protection division concentrates on measuring and evaluating radon occurrence, preparation, processing and evaluating of trace detectors within the Radon program of the Czech Republic and out of it. Furthermore the division performs personal dosimetry and monitoring in the area surrounding the ionizing radiation sources, as well as another laboratory and in-situ radioactivity measurements. A significant part of the activity is also the calibration, verification and testing for the approval of meter types, which the division executes at the Authorized metrology center. The station also covers research activity for radon dosimetry.

The chemical protection division concentrates on finding the presence, type, concentration and number of chemical substances in the workplace and in the environment both in the laboratory and in the field, furthermore on the quality evaluation of anti-chemical and other special preventive means for persons, as well as on the elaboration of methods for their testing and participation in their development. The division stations provide technical support for inspections performed by the SÚJB department for inspection of the adherence to the ban on chemical and biological warfare in the meaning of law no. 19/1997 of Coll., respectively of law no. 249/2000 of Coll.. The stations cooperate with the international Organization for the Prohibition of Chemical Weapons (OPCW) the Hague and with laboratories TNO Prins Maurits Laboratory, the Hague. A significant part of their activity is also the solution of research assignments as well as cooperation with other resorts and institutions, including the integration into the Integrated Safety System of the Czech Republic.

The biological protection division expanded its activities in the year 2002, which by that time concentrated in particular on human protection in extreme conditions, including the review of human individual protection means from an operationally thermal load point of view, and also of biological agents and toxins detection. This activity will be used especially during the inspection support performed by SÚJB inspectors in accordance with law no. 281/2002 of Coll., by which civil service in the field of adherence of bacteriologic and toxin weapons prohibition was entrusted to SÚJB. The division also participates in research activity and is involved in cooperation with national and international stations.

The separate division for inspection support fulfills tasks assigned by the SÚJB Regional center in Kamenná, which means in particular that it ensures inspections and local examinations, performs measurements and monitoring results processing in the former and current fields of uranium industry (presently s.p. DIAMO, Stráž p.R.), including old encumbrances and works performed in mining in the entire Czech Republic. The division also ensures the activity of the air control station within the Radiation monitoring network of the Czech Republic in Kamenná.

6.2 Results of SÚJCHBO expert activities

The main activity of the nuclear protection division, which the station of nuclear protection division concentrated on in the year 2002, is the measuring, evaluating and research of radon and its transformation products behavior, respectively the activities which closely relate to these problems. A significant part of this field is radon metrology. Another activity sphere is the performance of sample radiochemical and gammaspectrometric analysis.

On the level of theoretical works the station, in addition to another phase for research task solution for the "Development of methods for evaluation of dose load given by radon", concentrated in particular on:

a) radon and its transformation products Metrology Development task solution. The task solution required a series of experiments and challenging measurements and resulted in emphatic approximation of radon activity concentration measurement results in SÚJCHBO to the results of Physikalische-Technische Bundesanstalt Braunschweig measurements; the final report was submitted in November 2002;
b) radon and its transformation products measurement in the outdoor air focused on the investigation of relationships between emission area speed and state in the air and search for the ratio of radon equivalent activity concentration and radon activity mass;
c) attempts for specification of "compound of alpha uranium-radium series long-term radiation sources" to exactly specify the radionuclides which comprise it;
d) experiments with the usage of two types of trace detectors to specify the ratio of radon equivalent activity concentration and radon activity mass in homes.

A significant part of the nuclear protection division practical activity was especially work related to the Radon program of the Czech Republic. The preparation of passive trace detectors is important, which are then distributed by SÚRO stations into selected buildings. After one year of exposure they return to the trace dosimetry laboratory for processing (traces etching) and evaluation, consisting in determination of the number of alpha elements traces on KODAK LR 115 detection foil, on which basis the radon equivalent activity concentration is calculated.
The laboratory for trace dosimetry prepared and evaluated the following numbers of trace dosimeters in the past year:

	Activities for	
	Radon program of the Czech Republic	other physical and legal persons
	number of pieces	
PSD draw up	13 090	463
PSD evaluation	23 340	655

Another significant activity was to provide personal dosimetry for s.p. DIAMO, o.z. GEAM Dolní Rožínka, where the French system ALGADE is used and for o.z. SUL Příbram and o.z. TÚU Stráž pod Ralskem, which use the Czech system OD 88. These systems include the assessment of the acceptance of long-term radionuclides

compound emitting the alpha uranium-radium series radiation, and the photon radiation effective dose detected through TLD and latent energy acceptance.

Activities for personal dosimetry	
	number of assessments
system ALGADE	4 316
system OD 88	751

The monthly effective dose for an employee is determined by a calculation on the basis of obtained results, which is then reported to the Central registry of professional exposure.

The division laboratories also performed, within the monitoring, services and evaluation of ALGADE dosimeters, passive trace detectors and thermolumminescent detectors used for monitoring the environment in the area surrounding the current and former s.p. DIAMO stations in the entire Czech Republic and in the area surrounding other factories (e.g. Czech shaley factory - liquidation of former ČSA mine in Rynholec, Administration of Radioactive Waste Repositories in the repository of Brotherhood in Jáchymov, medical spa Jáchymov and others), which could, through their activity, adversely influence the environment in the sense of contamination with radioactive substances.

Activities for monitoring the environment	
	number of pieces
preparation and evaluation of ALGADE system dosimeters	191
PSD preparation and evaluation	417
TLD evaluation	117

Another practical activity of the nuclear protection division was to perform radiochemical and gammaspectrometric analyses. In the year 2002 the division performed sample analyses of waters, sediments, soil, fallouts, vegetables and filters (VAJ 04 and HUNTER). Eight hundred fifty seven analyses were performed in total. This activity was performed for MMKO RMS, as well as for various legal and physical persons. In addition to the radon diagnostics (11), the determination of 222Rn activity concentration in water (60 determinations), determination of radon index for building land (25 determinations) and measurement of radon and its transformation products in objects (35 measurements) were performed.
The Authorized Metrology center (AMS) was re-authorized during the year 2002 and re-accredited for radon activity concentration (in the air) and radon equivalent activity concentration meters. Its employees obtained the required certificates for the related activities. The calibration laboratory performed a total of 250 meter verifications in 2002.
A request was also made of the station for one approval of a new type of meter for radon activity concentration and radon equivalent activity concentration; the station started tests related to this activity which will continue in the year 2003.

The chemical protection division underwent organizational and technical changes in the year 2002. The laboratory for chemical monitoring and protection in Brno was moved to a new location at the beginning of the year. As part of this relocation an

unscheduled ČIA inspection took place on this accredited station, which found this station professionally qualified and capable for the accredited activity.
At this time the work on the laboratory reconstruction in Kamenná was also finished and the toxic substances division (laboratory) was established and assigned. The basic tasks of this station are the measuring, detection and identification of substances released into the workplace or into the environment, possibly of unknown substance samples provided by the Integrated safety system departments or by other departments and institutions working on these cases.
On the theoretical work level the station, in addition to the solution of previously assigned research tasks, concentrated on the following activities:

a) development of methods for measuring preventive means reliability, which in recent times is becoming more and more necessary; this means measuring preventive means leakage by means of nontoxic substances and without using volunteers as experimental persons; a newly developed portable chamber allows testing of not only the preventive means of respiratory organs, but of the whole preventive means, while the measurements are fully objectified by usage of nontoxic SF6 and the possibility of accurate measuring through a portable chromatograph with ECD detector; methods for leakage measuring of hoods, children's bags and jerkins and finally of complete preventive clothing were evaluated;
b) as part of the search for toxic substances substitutes, the station checked the model substances dosage, so-called simulators, benzoylchloride and methylsalicylate; these substances are still being checked and their suitability and reliability for these purposes is being verified also by international institutions with which SÚJCHBO cooperates;
c) identification possibilities of a RAID hazardous substances analyzer were extended as well, based on the principle of mass spectroscopy; it is presently possible to reach identification of other volatile substances with high sensitivity using this instrument;
d) the application of stationary gas chromatograph for substance identification and qualification with FID and INFRARED detector was monitored.

In a practical activity the division concentrated on performing accredited and nonaccredited tests, while most of the serious tests were of the leakage of preventive clothing for chemical specialists of the Czech Republic. A significant task was also the test of leakage of special preventive clothing, masks and preventive means for the population. A new portable testing chamber was developed for these purposes. Furthermore tests of foreign single-use clothing and Czech provenience CM 4 and CM 5 masks compatibility were performed, chemical filtration clothing ORI-TEST were tested, and tests of chlorine infiltration through three-ply filtration textile were performed. The station concentrated on the successive testing of MET-CHEM OPCH 90 clothing gastightness after use in Kuwait. Thirty tests of OPCH 90, AUER Vautex Elite and Remploy TRF 4 insulation non-ventilated preventive clothing gastightness were performed. Tests of insulation bag gastightness for dangerous parcels for postage purposes were performed as well.

Technical support of the inspection performed by SÚJB inspectors, in cooperation with the SÚJB Department for Inspection, consisted of the Adherence to the Ban on Chemical and Biological Warfare. SÚJCHBO employees participated in regular check

activities on selected industrial and research stations. The inspection support consisted in particular of sampling and performing required measurements and determination, including drawing up applicable documentation. The mobile laboratories were especially used for this activity.
In the continuation to "ANTRAX" action (see the Report of SÚJCHBO activity for 2001), which started in the Czech Republic immediately after the terroristic attack in the USA on 11 September 2001, HZS were delivered to SÚJCHBO for identification of unknown substances and parcels from the entire Czech Republic in the year 2002. These findings were processed in accordance with approved procedures for processing suspicious parcels, although their character moved from "unknown white powders" to unknown chemical substances findings. Three findings of unknown substances were significant findings of suspicious substances of this kind which were onboard ČSA airplanes and spillage of the "white powder" in Dělostřelecká street in Prague. Furthermore a few dozen kilograms of mercury and other specific substances were found in different places in the Czech Republic.
The division employees participated in coordination practice which was organized within the inter-department check on the theme of a biological weapons attack. The model practice was involved, during which all the elements that could be involved in this situation were checked. Within the scenario SÚJCHBO was entrusted to identify samples taken from the biological materials and the field and to determine the kind of biological contamination. This laboratory activity was evaluated very well.
The division employees also participated in the first international practice of OPCW (ASSISTEX) organization, which was held in Croatian Zadar. SÚJCHBO employees were responsible for the correct identification of unknown samples. This participation (with HZS logistic support) and mobile laboratory activity was extremely successful and its results were evaluated positively by OPCW.
The biological protection division, through its activity, concentrates on two different specializations. The laboratory for monitoring persons in extreme conditions concentrates in particular on performing expert measurements and tests of preventive means and clothing (as complex preventive systems), as well as on testing of persons during various loads in different microclimatic conditions. The second laboratory, the biological monitoring laboratory opened in October 2002, concentrates especially on the detection of dangerous biological agents and toxins. Both stations also concentrate on the solution of research tasks.
The most important events of the laboratory for monitoring persons in extreme conditions are the following:

1. performing load tests of new field equipment for the army of the Czech Republic. The measuring ran during probands' simulated working load in specified climatic conditions in the tropics and in geographical areas with high temperatures (up to 45°C) with humidity from 20% to 90%. The purpose of these tests was to compare individual types of provided equipment;
2. tests of special anti-chemical clothing and the appraisal of their influence on proband working ability and physiology. The objectives of the tests were to determine the time of clothing physiological usability in conditions of 20° to 45°C temperatures, with relative humidity 40% to 50% and during moderately difficult work. The tests were performed by selected specialists/volunteers;
3. testing of the Czech anti-chemical unit members who will participate in international activities; the members of this unit went through tests in the chamber dressed in the anti-chemical clothing which is part of their equipment.

The objective of the tests was the acclimatization of this unit's new members for extreme Middle East climate conditions.

The biological monitoring and protection laboratory was established in October 2002, when SÚJB finished the reconstruction of a building on the premises of Kamenná and built a station with category III and IV laboratories. The station was ceremonially opened by the SÚJB chairman with prominent guests in attendance on October 24, 2002. The main activity of the new laboratory concentrates on biological agents and toxin detection. The laboratory will be used in particular for inspection support performed by SÚJB inspectors on workplaces with highly dangerous and dangerous biological agents and toxins and for the inspection of suspicious substances for these agents and toxins content (see law no. 281/2002 of Coll. and edict no. 474/2002 of Coll.). The laboratory was equipped with basic instrumentation to meet these purposes. It will be necessary to equip this laboratory in the future so as to be capable of fulfilling all required tasks. The laboratory introduced molecular methods for detection - real time PCR (polymer-impact chain reaction), which is based on the presence or absence of genome DNA specific for given biological agents. Considering the necessity to detect the potentially dangerous parcels for Bacillus anthracis presence, the method for this agent detection was introduced as the first.

Mass spectrometry is based on sample pyrolysis at a temperature of 600°C and the identification of individual dangerous substances. It is capable of recognizing if a dangerous agent or toxin is involved. Work began in the laboratory on research tasks which propose to extend and accelerate individual methods for biological agents and toxins identification, to which the edict no. 474/2002 of Coll. applies, by which the law no. 281/2002 of Coll. is performed.

The individual division for inspection support concentrates its activity on inspection support performed by the inspectors of SÚJB Regional center in Kamenná. The division employees, who work in Kamenná and in Dolní Rožínce, ensured the inspections in underground and surface stations of s.p. DIAMO and in other stations on the territory of the entire Czech Republic, where the works are performed by mining (they participated in a total of 28 inspections in 2002). This was in accordance to the RC SÚJB inspections plan. During these inspections they provided the following:

- measuring of effective dose rates from gamma radiation internal exposure;
- determination of long-term radionuclides compounds activity concentration emitting alpha uranium-radium series radiation;
- determination of radon transformation products latent energy concentration;
- determination of surface contamination with radioactive substances emitting alpha elements;
- sampling of waters, stones and sediments to determine specific activity of natural uranium and 226Ra.

The samples were processed and analyzed in SÚJCHBO laboratories.

In accordance with inspectors' requirements, a part of the activity is also the individual performance of local examinations (137 of these examinations were accomplished in the year 2002) needed for executive administrations, led by SÚJB, or in which they participate. Another significant part of the division's activity is measuring and sampling within the inspection control monitoring network, focused in particular on stations' outlets and influence - the authorization holders in accordance to § 9, paragraph 1, of the Atomic law for work with ionizing radiation natural sources.

Significant parts of this activity are:

- monitoring old loads at stations in the area of Příbram, in the area of West Bohemia, Okrouhlá Radouň, Mydlovary and Dolní Rožínka, which monitors the air influence with radon and its transformation products from current and former workplaces of uranium mines;
- water sampling to determine the activity concentration of natural uranium and 226 Ra in the stated localities of selected river basin.

The station also ensures the measuring point MMKO RMS in Kamenná - the measuring of dose and dose rate and sampling of aerosols and fallouts is performed. The results are submitted to the Radiation Monitoring Network Headquarters.

6.3 Special events with SÚJCHBO participation

6.3.1 Actions during the floods

During the disastrous August floods in the basins of Vltava and Labe Rivers, many chemical substances were released into the environment. The most serious case was the release of a significant amount of chlorine and other substances from the Spolana joint-stock company, Neratovice. On request of the Integrated Safety System the employees of SÚJCHBO chemical protection division carried out measuring and sampling here several times using the mobile laboratory. They monitored not only the situation in the factory, but also monitored the air in Neratovice and in the surrounding villages (chlorine cloud movement monitoring). They also monitored the situation in Neratovice while the chlorine storage tanks were being re-pumped and identified the content of containers which washed away. An extensive separate report (review), which evaluates the overall measurements of all resorts in this area during the floods, was elaborated upon at the request of the Czech Republic Police. The water and soil were sampled again and measurements taken after the water receded.
Another release of chemical substances which occurred during the floods and which had an adverse affect on the population was the release of chemical substances from the pharmaceutical factory ICN Czech Republic, a.s. in Roztoky at Prague. In this area the SÚJCHBO employees monitored the occurrence of organic compounds in the air and in the water as well during their release from the production facility.

6.3.2 Activities during the NATO Summit in Prague, November 2002

The employees of SÚJCHBO chemical and biological division were involved, together with pyrotechnists and other specialists including NRPI employees, in monitoring the premises of the Congressional Center, Prague castle, the castle in Lány and its surroundings and other places where Summit participants were present. The first phase consisted of precautionary building inspections including their technical structure (e.g. air-conditioning equipment) and marking danger points in cooperation with foreign specialists. Am analytical and decontamination station was then installed in the Congressional Center and another provisional station was installed in the new premises of SÚJB in Bartoškova street in Prague.
During the Summit some SÚJCHBO employees were employed to secure departures and events within the Integrated Safety System, during checks in the Prague Castle

locality, and ensured negotiations in the Congressional Center and other specified localities.
Considering the job performance demand and duration as well as the necessity for preparedness at all times, the event required exceptional personal effort of all involved. After the Summit the relevant departments and institutions very highly evaluated the efforts of SÚJCHBO in this special event.

6.4 Institutional research and educational activities

SÚJCHBO completed the following approved research tasks in 2002:

1. Development of methods for the evaluation of dose load given by radon;
2. Quantitative measurement of preventive materials and means of infiltration and leakage by means of corresponding toxicant replacements;
3. Finding a replacement for human subjects for the purpose of testing individual preventive means for persons in conditions with extremely toxic substances;
4. Analytic procedures for detecting the presence of explosives.
5. Elaboration and implementation of methods for the identification of biological toxins with mass spectrometry;
6. Improvement of methods for the appraisal of various thermal load influences on a person working in special preventive clothing;
7. Certificate for the detection of Bacillus anthracis and other selected pathogens using PCR and real-time PCR methods.

SÚJCHBO educational activity is part of the authority of SÚJB to professionally prepare select employees of stations with natural exposure sources for:

1. controlling works with ionizing radiation sources which may be treated on the basis of permission only;
2. performing permanent supervision over maintaining the requirements of radiation protection,
3. control of the subsequent tests and services in the field of radiation protection;
4. providing personal dosimetry services;
5. measuring and evaluating radon and radon transformation products as they occur on building lands and building sites;
6. measuring and evaluating natural radionuclides content in building materials and in water.

In November 2002 SÚJCHBO organized a course for those employees working with ionizing radiation sources and those permanently supervising the requirement maintenance of radiation protection in stations with natural radionuclides. In the following month a seminar was organized on law no. 281/2002 of Coll. of certain precautions related to the prohibition of bacteriological (biological) and toxin weapons.
The chemical protection division station concentrated in particular on educational activities for a wider sphere of expert employees. A lecture was prepared and delivered for the Police Academy, for HZS districts heads, and others. Expert information with demonstrations were submitted to the Chamber of Deputies, NATO representatives, OPCW etc..
The publication "Protection of persons during a chemical and biological hazard" was processed on CD-ROM. The nuclear protection division co-organized the Sixth

International Workshop on the Geological Aspects of Radon Risk Mapping, which was held on September 20 - 23, 2002 in Prague. As part of this event, the division provided international comparative measurements of radon mass emission and measurement of radon emission area speed.

7. Activity of the Department for Inspection of the Adherence to the Ban on Chemical and Biological Warfare

Since 2000 SÚJB, as the central organ of the Civil Service, has been guaranteeing assignments resulting from the Convention on the Prohibition of Chemical Warfare (hereinafter only CWC) as well as the assignment resulting from the Convention on the Prohibition of Bacteriological & Toxin Warfare (hereinafter only BTWC) since the year 2001. This happens through a separate Department for Inspection of the Adherence to the Ban on Chemical and Biological Warfare (OKZCHBZ).

7.1 Guaranteeing assignments resulting from the Convention on Prohibition of Chemical Warfare

In the year 2002 the division's activity proceeded from the assignments resulting from CWC, which became effective in the year 1997, its regulations reflecting law no. 19/1997 of Coll. of some precautions related to the prohibition of chemical warfare in the version of later regulations and MPO edict no. 50/1997 of Coll..

Forty-seven organizations with 126 plants submitted declarations of their activities for the year 2001 to SÚJB on January 31, 2002. These are organizations which work with the specified substances or they produce organic substances which are subject to CWC. In addition to these data, the data of the import and export of specified substances were included in the declaration of overall national data, according to 90 licenses granted by the License office of the Ministry of Industry and Trade. Data of selected chemical substances from three organizations and for four plants were included into the declaration of planned activities for the year 2003.

OKZCHBZ employees carried out 28 planned and two exceptional inspections of plants in the year 2002. The inspection results corresponded with the data reported by the plants in question and the creation of conditions for international inspections acceptance was checked. Furthermore, two international inspections of the Organization for the Prohibition of Chemical Weapons (hereinafter only OPCW) in The Hague took place in the Czech Republic in the year 2002.

Two sessions of the highest OPWC organ were held in the previous year – the Conference of contractual states. An extra conference took place first, in which it was decided to discharge the managing director J. Bustani and to appoint a new managing director, R. Pffirter from Argentina. A proper conference followed then to fulfill CWC commitments and to confirm a budget for the year 2003.

Czech specialists participated in many OPCW seminars, where they passed on our experiences during the implementation of the Convention. Some Czech experts work in OPCW specialized commissions. The OPCW uses highly competent Czech stations, which are focused on protection against chemical weapons to organize international training held here in the Czech Republic.

There was a training of specialists for the civil protection of CWC contractual states against chemical weapons in the Institute for Population Protection in Lázně Bohdaneč in the year 2002. There was also a training of OPCW inspectors in Vyškov for working with highly dangerous substances, which was organized by the Military Technical Institute in Brno.

The mobile laboratory of SÚJCHBO Příbram obtained great international prestige when it participated in ASSISTEX 2002 training in Croatia in September 2002. The mobile laboratory received a very positive evaluation.

7.2 Guaranteeing assignments resulting from the Convention on Prohibition of Bacteriological & Toxin Warfare

Control over the nonproliferation of bacteriological and toxin weapons was regulated by law in Czech Republic for the first time in the year 2002. The new law no. 281/2002 of Coll. assigns SÚJB the task of administration in the field of maintaining the prohibition of bacteriological (biological) and toxin weapons as well as the authority of the national office for the fulfillment of the Convention on Prohibition of the Development, Production and Storage of Bacteriological (Biological) and Toxin Warfare and on their Destruction. A long-term strategy for the connection of control over the nonproliferation of nuclear, chemical and biological weapons into one civil service was fulfilled with this legal act, including of course the responsibility for implementing commitments resulting from international contracts to which the Czech Republic acceded.

SÚJB submitted, via, a voluntary declaration to UN Headquarters in New York in April 2002 which contains information of infectious illness occurrence on the territory of the Czech Republic, of publication activity, of the release of research results and their usage, of organized conferences, and of vaccine production equipment.

A fifth session was held in November which evaluated the conferences of BTWC contractual parties. Although Verification protocol was not accepted during this session, the process of international control over maintaining commitments resulting from BTWC did not stop. The involved countries agreed that another evaluating conference would be held by the end of the year 2006 at the latest. Annual conferences of BTWC contractual parties are to be held in years 2003–2005, during which national precautions for the implementation of commitments contained in BTWC (including the upgrade of criminal law), national mechanisms for the creation and maintenance of safety and supervision over pathogenic microorganisms and toxins, and international cooperation in the investigation and reaction in the case of biological and toxin weapons or illness eruption will be discussed. SÚJB employees participated with the Ministry of Foreign Affairs in the preparation of information of this conference for the government of the Czech Republic.

A laboratory with biological protection degree three began operation in SÚJCHBO in the year 2002 which is to serve, in addition to other tasks, for support during the inspection and identification of biological agents and toxins. Several expert assignments concentrated on the development of these activities.

SÚJB issued a publication in connection with the effectiveness of a new law and edict which contains an overview of highly dangerous biological agents and toxins. OKZCHBZ employees, in cooperation with SÚJCHBO, participated in training for the

interpretation of law no. 281/2002 of Coll. and its executive edict for companies and organizations to which the law applies.

8. Control and technical support

8.1 Personnel qualification and preparation

Preparedness of shift personnel before start-up of all four NPP Dukovany units after refueling was checked by four planned inspections. The inspection, which focused on personnel preparedness before start-up of unit 2 active testing, took place at the NPP. Two controls were performed on research nuclear facilities VR 1 and LVR 15. These controls focused on basic critical experiment progress in accordance with an applicable program and its documentation. They were also focused on each shift occupied by selected employees with an applicable certification in accordance with shift commands. No defects on the basis of performed controls were found which could be considered a breach of the Atomic Law and of consequential legal regulations.

The SÚJB performed another revision and update of test question files for selected employees of both ČEZ, a.s power plants in the year 2002. A revised statute of the test commission for the verification of expert qualification of selected employees of nuclear facilities was issued in continuation to an amendment of the Atomic law and of related legal regulations.

The state test commission held a total of nineteen meetings in the year 2002. Special expert qualification was verified for 102 selected employees of the nuclear facilities. Three of the applicants failed the oral test. The success percentage of tests passed for the first time is 97%. Two unsuccessful applicants passed the repeated oral part of the test with satisfactory results again in the year 2002. The SÚJB issued a certificate of selected employees' action authorization on nuclear facilities in the Czech Republic to the successful applicants.

The verification of special expert qualification for activities, important especially from the radiation protection point of view, also continued before SÚJB expert test commissions. Special expert qualification was verified for 3191 people. Of these applicants 2928 succeeded and the certificate of special expert qualification authorization was issued to them, and 263 did not succeed.

8.2 Legislative activity

The SÚJB concentrated its 2002 legislative activity on the completion of legislative activities began in the last period and on the implementation of newly accepted legal regulations. An amendment of law no. 18/1997 of Coll. (the Atomic law) became effective in the nuclear safety and radiation protection field on July 1, 2002, which brought this law into harmony with the European Community law began in 1997. This amendment was then added to the Atomic Law executive notices by the end of September 2002. New notices were issued in the fields, where there were wider changes, or where completely new legal modifications were involved. The following are involved:

Edict no.179/2002 of Coll., which itemizes a list of selected items and of items of double usage in nuclear field,
Edict no. 307/2002 of Coll., of radiation protection,
Edict no. 315/2002 of Coll., which amends Edict no. 146/1997 of Coll., which determines activities that naturally influence nuclear safety, and activities important especially from the perspective of radiation protection, requirements on qualification and expert preparedness, a method of special expert qualification verification and authorizing selected employees, and a method of completion of approved documentation for permission to prepare selected employees,
Edict no. 316/2002 of Coll., which amends Edict no. 145/1997 of Coll., of nuclear materials evidence and control,
Edict no. 317/2002 of Coll., of transport and transfer, of approval of the type of wrapping packages for transport, storage of nuclear materials and radioactive substances, of approval of the type of ionizing radiation sources and of transport of nuclear materials and specified radioactive substances (of type approval),
Edict no. 318/2002 of Coll., of details for guaranteeing emergency preparedness of nuclear facilities and workplaces with ionizing radiation sources and of requirements on internal emergency plan and emergency code content,
Edict no. 319/2002 of Coll., of the function and organization of the statewide radiation monitoring network,
Edict no. 419/2002 of Coll., of personal radiation ID cards.

The implementation of such extensive amendment of legal regulations in the nuclear field will require attention in the coming period as well, on the part of both state authorities and applicants as permission holders. Some Atomic law amendment provisions will become effective on the day of The Czech Republic's accession into the EU. However, it will be necessary to complete all preliminary works in cooperation with EU and EC authorities, so the transition into the new legal system will be without any problems.

The law of some precautions related to bacteriological (biological) weapons prohibition and of Trade law change was published in the field of control over proliferation of chemical, biological and nuclear weapons in the Czech Republic Code under no. 281/2002 on June 28, 2002, which prepared SÚJB in cooperation with other interested departments. The law, as well as its executive Edict no. 474/2002 of Coll., is effective from January 1, 2003. For this reason SÚJB gave thought to the enlightenment and explanation of new legal modifications to the authorities and organizations whose activities could be influenced by affecting this new law in the second half of the year 2002.

8.3 International cooperation

SÚJB's activities in the field of international cooperation were concentrated on maintaining and developing bilateral contacts with partnership inspections and on implementing commitments in the year 2002, which for the Czech Republic results from international contracts concluded within the authority force. A significant event

which SÚJB coordinated in this field was the Czech Republic's participation in the second evaluation session of the Convention of nuclear safety contractual parties. As with the previous period, SÚJB's international relationships influenced the progress of testing and test operation of Temelín nuclear power plant in both units. The authority actively participated in the implementation of commitments resulting from negotiations between the Prime Ministers of Austria and the Czech Republic, which concluded in Brussels in December 2001 with the attendance of EC commissioner Verheugen. The authority primarily ensured the coordination of international technical cooperation in correspondence with § 3, paragraph 2, letter T of the Atomic law in the scope of its force where the authority provides expert cooperation with IAEA. SÚJB's participation during technical negotiations within the process of the Czech Republic's accession to EU remains significant as well.

8.3.1 Bilateral cooperation

As concerns bilateral cooperation, one of the SÚJB's important priorities remains cooperation with neighboring countries, i.e. with Germany, Slovakia, Austria and Poland. Another bilateral cooperation was begun in the last period with the European Union countries and states with a significant program of the peaceful utilization of nuclear energy and ionizing radiation, such as France, the Ukraine, the United States of America and Japan. Contacts with countries of the region such as Hungary and Slovenia remain important as well.

Federal Republic of Germany

An annual meeting organized in accordance with the Agreement of modification of common ground questions related to nuclear safety and protection against radiation between the CSSR government and Federal Republic of Germany government was held in Munich in June. A technical visit at the Isar 2 NPP was part of this meeting. Both parties took advantage of the meeting to present current developments in the field of nuclear energy and ionizing radiation utilization, and technically significant events at nuclear power plants in both countries, especially concerning safety. The Czech delegation reported on the Temelín NPP start-up progress in particular. The German side reported on the past three significant events at Philipsburg and Brunsbuetel power plants. The question of when and especially how much the inspection authorities have to inform each other of less significant events which do not fall under the international conventions system, dominated the discussion in the final bilateral meeting.

The exchange of long-term experiences, useful for both parties, continued in the field of waste and spent fuel storage, where the German side assessed the sophisticated procedure of the Czech side at a few expert meetings. German experts participated in two expert seminars in the last year which SÚJB, in cooperation with Temelín nuclear power plant and ÚJV Řež, organized during the processing of documentation for the implementation of two recommendations. These recommendations issued the ad-hoc working group for questions of nuclear safety in the context of EU enlargement towards the Temelín nuclear power plant in the year 2001. During these seminars the GRS experts assisted significantly in an open discussion over the problematic aspects of provisions proposed by the Temelín nuclear power plant operating organization in reaction to the above stated recommendations.

Representatives of competent authorities in the field of nuclear safety and radiation protection from both countries, as well as experts from cooperative institutions from both the Czech and the German side, participated in individual expert meetings and their preparation. Worth mentioning, among others, are the GRS and Öko-Institut Darmstadt on the German side and ÚJV Řež, a.s., Temelín Nuclear Power Plants and Dukovany Nuclear Power Plant on the Czech side. SÚJB and BMU exchanged a great deal of specific information in written form outside of the official bilateral meetings, which relate in particular to nuclear power generating equipment.

Austria

SÚJB's activities towards Austria, in addition to the usual bilateral communication, concentrated on the support of the fulfillment of commitments in the previous year which result from the negotiations of Prime Ministers of Austria and the Czech Republic to the problems of Temelín nuclear power plant finished in Brussels in December 2001. The individual activities could be divided to

- expert cooperation of experts and seminars for safety questions identified during the above stated meetings,
- negotiations towards revision of intergovernmental bilateral contract of mutual cooperation and information exchange.

In the first area, four events took place in 2002 which related to the following safety questions:

- comparison of calculations used for the evaluation of radiological effects of possible serious accidents (two meetings of working group),
- concurrency of steam and water pipelines at elevation 28.8m and verification of functional fitness of safety valves (seminar),
- verification of the condition of equipment which relate to nuclear safety with regard to environmental conditions (seminar).

From the Czech perspective, all the expert events were organized with the objective of explaining the individual safety questions and safety assurance of Temelín nuclear power plant to the Austrian side, and this on a more graphical and detailed level than was possible during the meetings within the so-called "Melk process". Preparation of the individual events required an exceptional effort of many experts from SÚJB, Temelín nuclear power plant and its suppliers, especially ÚJV Řež on the Czech side. They were able to ensure the quality course of all events although in many cases the activities performed extra to working capacities during the start-up of both units of the power plant. According to SÚJB the results and real course of all activities proved positively that questions of nuclear safety defined in such way relate to a discussion on an expert level. The nonexistence of definite regulations and of criteria universally applicable for various types of nuclear facilities projects certainly do not permit a positive appraisal of the sufficiency of individual safety precautions during such meetings. However the regular transfer of information between partners could bring larger transparentness and support the process of building mutual trust. During the regular annual bilateral meeting, both sides agreed that all activities in 2002 fulfilled the intentions in the conclusions from the negotiations of Prime Ministers of both governments in Brussels.

Four meetings were held to prepare the proposal of intergovernmental bilateral agreement changes. Both sides listed problems which from their point of view should be solved by a textual change in the agreement. Significant progress was reached in the approach of the opinions of both sides on the structure of pending agreements, respectively acts which, together with the amended agreement, would form a framework for cooperation of both countries in this field in the future.

The regular bilateral meeting had a very wide program in December 2002, in addition to the evaluation of the first year of the implementation of commitments which resulted from the negotiations of Prime Ministers of Austria and the Czech Republic to the problems of Temelín nuclear power plant. This program focused on the mutual exchange of information about the development of legislation, nuclear facilities operation, wastes and spent fuel storage, radiation monitoring network and emergency preparedness.

Slovakia

The cooperation between SÚJB and the Slovak Office for Nuclear Inspection continued in 2002 as well, especially on an informal basis. Its focus consisted of consultations over common ground themes on the level of both national regulators management and on the inspectors' level. Mutual visits of experts contributed significantly, from the SÚJB point of view, to the exchange of information from the inspection of equipment of identical projects and provenience. Informal cooperation was also effective during multilateral projects organized under IAEA and the European Union program PHARE.

An intergovernmental agreement on the announcement of nuclear or radiation events was signed in June which relates to a similar multilateral Convention of Early Warning. Both countries signed the commitment resulting from the Convention of Nuclear Safety for Neighboring Countries with Operational Nuclear Power Generating Equipment.

The regular bilateral meeting was held in České Budějovice in October together with a visit to the Temelín nuclear power plant. The discussion, in addition to information of operational events at the NPP, related in general to equipment safety at the NPP, emergency preparedness and the storage of waste.

Poland

Forasmuch as Poland does not have nuclear power engineering, the emphasis in cooperation SÚJB with Polish Commission for Atomic Energy was based on the submission of information which relates to nuclear safety and radiation protection and in particular on the submission of information which relates to Temelín nuclear power plant start-up. Works on an intergovernmental agreement text were completed during the year 2002 which modify the field of early warning in case of a nuclear or radiation event on the territory of both states. An interdepartmental remark control began on both sides and the contract is expected to be signed in the year 2003.

France

Cooperation with France on a bilateral level especially included the participation of French experts in two expert seminars in the year 2002 which SÚJB, in cooperation with Temelín nuclear power plant and ÚJV Řež, organized during the processing of documentation for the implementation of two recommendations which the ad-hoc working group for questions of nuclear safety in the context of EU enlargement issued towards the Temelín nuclear power plant in 2001. The focus on multilateral level was in cooperation on the implementation of PHARE projects. One particularly significant project focused on the completion of a long-term safety evaluation of a VVER 440 reactors suppression system.

The United States of America

Cooperation with US inspection in nuclear safety still consisted in the common work of experts on multilateral projects (in particular under IAEA). The agreement of cooperation in the use of thermohydraulic calculation programs was reopened in the year 2002. The Czech experts participated in working groups of users of codes which form the basis of apparatus used in the Czech Republic for nuclear power plant safety analysis.

Japan

Technical cooperation with Japan has developed for a long time within a project of Japanese government which focuses on the exchange of experiences in the form of experts research fellowships from Middle and Eastern Europe countries and from Southeastern Asia. SÚJB fulfills the role of program coordinator in the Czech Republic. Within the program the Czech experts participate in expert seminars and training courses focused on specific fields of nuclear safety, radiation protection, nuclear power plant operation and radioactive waste treatment.

Hungary

During a bilateral meeting in Prague in July 2002, chairmen of national regulators signed an agreement of cooperation for both organizations and of information exchange. The target of the agreement was to provide a formal frame for cooperation in long-term development, in particular over themes related to the operation of Dukovany and Pakš nuclear power plants with VVER 440 reactors. The nuclear part of both power plants is equipped with identical technology produced in former Czechoslovakia. One of the interesting themes of the meeting were questions related to the protraction of the life of such nuclear power plants. The Hungarian side has already begun the preparation of appraisal of possible request from an operating organization. The decision is expected at the end of this decade. Both sides agree on the advantageousness of informal cooperation on international projects organized under IAEA and within the European Union program PHARE as well.

Slovenia

The regular bilateral meeting with Slovenian nuclear inspection was held in July as well. The meeting included a technical visit to the Dukovany nuclear power plant. Considering different provenience of nuclear power plants in the Czech Republic and in Slovenia, the main questions in discussion focused on the development of legislation, emergency preparedness and wastes and spent fuel storage. An important common theme was also inspections and their planning (regular inspections, reactive inspections, inspections with hazard knowledge). Coordination of steps in the international technical cooperation is in the interest of both sides.

8.3.2 Multilateral cooperation

SÚJB's activity within multilateral relationships was in 2002, as well as in previous years, concentrated on international organizations such as the IAEA, preliminary committee of organization for the control of maintaining the Comprehensive Nuclear-Test-Ban Treaty (CTBT) or the Organization for Economic Cooperation and Development Nuclear Energy Agency (OECD NEA), on the fulfillment of commitments resulting from multilateral international contracts. Development of contacts with the European Commission and its consultative authorities or the participation in work of Regulators Association of Countries operating VVER reactors come under the category of SÚJB multilateral relationships. Work contacts with the Western European Nuclear Regulators Association (WENRA), which started in the year 2000, continued in the year 2002.

International Atomic Energy Agency (IAEA)

IAEA is a dominant presence in the SÚJB multilateral international cooperation. SÚJB is by law a holder of technical cooperation with this expert agency, classified in the UN organizations system. SÚJB fulfills this cooperation with the coordination of Czech experts' participation in IAEA consultative authority activities, technical committees and expert groups meetings. A significant part of this cooperation is based in part on the creation of standards and recommendations which IAEA issues for the peaceful utilization of nuclear energy and ionizing radiation. These standards and recommendations are in most countries, including the Czech Republic, the base for national regulation creation. The office cooperates with IAEA during the control of nonproliferation on the territory of the Czech Republic.

A significant event in the relationship to IAEA was the election of the Czech Republic as an inconsistent member of the Board of Governors for the period 2002-2004. The Czech Republic government appointed, through the Secretary of State, Dana Drábová as SÚJB chairperson in a governorial function. SÚJB, in cooperation with other interested departments, wants, through AEA management, to confirm a significant position of the Czech Republic in the peaceful utilization of nuclear energy during the biennial functional period. The most serious questions which IAEA will concentrate on in the near future will be activity planning for years 2004-2005, possible priority changes and related changes in financing. As per technical issues, the focus will remain on the completion of new edition standards which are

recommended for the peaceful utilization of nuclear energy and issues of technical precautions in the fight against terrorism.

One of the most significant services which IAEA provides to member states is an independent appraisal of various fields related to nuclear safety and radiation protection assurance. IAEA provides these services on request of the member country government by dispatch of control team with representative international participation. The control team always works according to a resolutely determined methodology and with clearly determined appraisal criteria. IPPAS team (International Physical Protection Advisory Service) was invited to the Czech Republic in the year 2002 in accordance with the long-term strategy of the regular utilization of IAEA control missions for checking the individual areas necessary for the assurance of high safety during the utilization of nuclear energy and radiation protection. Experts from the USA, France, Canada, Ukraine, Lithuania and IAEA performed a detailed inspection of all aspects of Temelín NPP physical protection. The experts' resultant report evaluated the physical protection assurance of this nuclear facility as very good and observed a level corresponding to current requirements and criteria of good world practice. The grade of personnel assuring the physical protection was found adequate both in qualification and in professionalism. From the SÚJB point of view the mission results correspond with the long-term results of inspection activity at the power plant.

One of the IAEA activity pillars is an organization of a Program for technical cooperation in the peaceful utilization of nuclear energy. SÚJB fulfills the role of coordinator of this program in the Czech Republic. The program is divided into the "national" part (specific for each member country, usually biennial cycles) and into the "regional" part (more countries participate, usually planned in quadrennial cycles).

The following "national" projects for the 2003-2004 cycle are currently approved and prepared within the Program of technical cooperation between the Czech Republic and IAEA:

- **CZR/2/003** – Strengthening the Analytical Laboratory at the National Physics Institute (new project) – strengthening of ÚJF AV Czech analytic laboratories including instrumental equipment and the implementation of new, now inaccessible, analytic methods, increasing analytic service effectiveness based on techniques using neutron and ion beams bundle in ÚJF Řež analytic laboratories;
- **CZR/4/009** – Evaluation of Radiation Damage Attenuation in WWER Reactor Pressure Vessel and Core Internals (enlargement of the previous project from the 2001-2002 cycle) – study of radiation damage of nuclear power reactor vessel including an expert system for evaluation of in-core constructional material properties and behavior in great fluxes; the project was enlarged for spectrometric methods application for determination of neutron beams bundle spectral and dozimetric parameters, i.e. to characterize neutron and γ fields in exposed objects and for spectrometric finding of radionuclides which emit α-radiation in cooling water to raise the LVR-15 reactor operating reliability and safety;
- **CZR/4/010** – Automatic Data Acquisition and Evaluation System for Research Reactor (continuation of the previous project from the 2001-2002 cycle) – system for the automation of operating and experimental data acquisition and modification including their evaluation on

academic VR-1 reactor for training of specialists from nuclear power plants and of ČVUT-FJFI students, increasing training quality and grade in experimental reactor physics, nuclear facilities operation and nuclear safety and radiation protection;

- **CZR/9/015** – Enhancing Regulatory Body Assessment Capabilities (new project) – strengthening of SÚJB capacity and possibilities for expert appraisal of safety questions, performing safety missions and training of SÚJB, Dukovany NPP and Temelín NPP personnel on the basis of IAEA recommendation.

In addition to these projects, another project was implemented by IAEA in the year 2002 with the objectof of providing immediate help to ÚJV Řež, Nuclear Physics Institute of Czech Academy of Sciences and the FJFI ČVUT academic reactor, which were affected by floods in summer 2002:

- **CZR/9/014** – Equipment Replacement at the Nuclear Research Institute – replacement and recovery of instrumental technique and equipment for radiation monitoring and radiation protection, which was irrecoverably destroyed as a consequence of the catastrophic flood.

The project was fulfilled by the end of the year, thanks to coherent assignments from recipients side and in particular thanks to very good organization from IAEA. Both institutes and academic reactor obtained significant help during the reconstruction of equipment damaged by floods in the form of specific equipment supply. The uniqueness of this help consists especially in the promptness how the supplies were delivered to recipients.

National projects began previously have been concluded in the year 2002. It is necessary to mention in this connection the still continuing highly successful activity of PET Center in the Hospital Na Homolce, which is the result of a very successful project of technical cooperation realized in the years 1997 to 1999.

SÚJB and other Czech organizations assisted in the organization of many activities within the "regional" part of the Program for technical cooperation organized by IAEA for European countries during the year 2002. Seven expert seminars were held in the Czech Republic in the past period. The focus of individual activities was very miscellaneous and covered for example the qualification of inspection systems, nuclear facilities operation safety, RAO repositories and their technical appraisals, and the application of safety analysis. More than 50 experts from the Czech Republic participated in other activities (conferences, sessions, seminars, training courses) organized within the regional part of Program for IAEA technical cooperation, focused in particular on the safety of power plants with VVER reactors, general questions of radiation protection and emergency preparedness. Questions related to the fight against terrorism and nonproliferation increased among the themes.

The Czech Republic is included in the program for technical cooperation with IAEA not only as a recipient of help, but also as a country contributing to the projects of other countries. The Czech Republic contributed 1,7 mil. CZK to support the national

project for technical help in Armenia in the year 2002, which is focused on analyses and optimization of primary circuit integrity and strengthening of safety of Medzamor nuclear power plant with VVER 440 reactor. Power supplies from Medzamor NPP are for Armenia, in particular during wintertime, vitally important, because they cover almost half of the total power consumption. Furthermore 0,5 mil. CZK was provided for technical support for Georgia through the regional project for assurance of radiation protection, in particular during medical applications and 0,459 mil. CZK for technical help to Ukraine also through the regional project for increasing the safety of Záporožská NPP by means of secondary circuit chemical modes modification.

Technical and financial help the Czech Republic through IAEA is planned for Armenia, Moldavia, Ukraine and Uzbekistan in the year 2003.

SÚJB continued, as in previous years, within multilateral technical cooperation with IAEA Vienna in the expert and organizational provision of scholarship stays and short scientific journeys for specialists from member countries, especially from Middle and East Europe countries, Asia, Africa and South America. Sixty-four specialists from various fields of the peaceful utilization of nuclear energy were trained within this cooperation with IAEA in the Czech Republic in the last year. Long-term scholarships in lasting from 3 to 6 months were realized in particular in the field of radiation protection and nuclear medicine. Shorter scholarships in duration of 1 - 2 months were realized in the fields of reactor technology, nuclear physics and treatment of radioactive wastes. Short scientific journeys lasting 1 to 2 weeks were realized in the fields of nuclear safety, state supervision performance, legislation and emergency planning. The greatest number of scholarships was given by the Agency to specialists from SNS countries and from Middle East countries in the year 2002.

The Czech Republic contributed US$ 130.670 and US$ 17.426 for the year 2002 to the IAEA technical help fund, i.e. 8% from the total accepted technical help provided to our experts in the year 2001.

At the request of SÚJB, a seminar dedicated to a probabilistic safety analyses for evaluation of safety level of nuclear power plants was held in Prague (PSA Seminar for SÚJB Executives, PSA Course for SÚJB Staff).

Convention on nuclear safety

The coordination of the Czech Republic's procedure for fulfillment commitments resulting from the Convention on nuclear safety was one of the significant activities which SÚJB performed on Czech governmental authorization in international cooperation in the year 2002. This activity concluded with the active appearance of a Czech delegation at the 2nd evaluation session of the Convention on nuclear safety contractual parties which was held in Vienna in April of last year. Information of session results was submitted to the Czech Republic government in June 2002. The Convention is the only current internationally legal instrument for the appraisal of nuclear safety questions within the international criterion. During the evaluation session, the Czech delegation defended the national report of the Czech Republic evaluated for the Convention on nuclear safety purposes and confirmed again that our country fulfills all commitments resulting from the Convention without any

residuals. A series of suggestions and recommendations arose of course from the meetings considering all of the attending states. Implementation of these suggestions and recommendations would increase the level of assurance of the nuclear safety of nuclear power facilities. Member states' discussions over procedural proposals continued to improve the entire process of the Convention fulfillment. The Czech Republic supports most of these proposals, in particular the proposals which would bring greater transparentness into the whole system.

OECD/NEA

SÚJB continued in cooperation with OECD/NEA in 2002 as well. SÚJB representatives participated in regular sessions of the permanent committee of associate representatives of CNRA (Committee on Nuclear Regulatory Activities) regulators and in activities organized by other NEA permanent committees. The office chairperson was invited as one of the main speakers at a common conference of OECD/NEA and WANO held on the theme of evaluation of the level of safety assurance of nuclear power plants nuclear and the method of its resulting communication. Results of this conference confirmed that in spite of the offer of new sophisticated instruments for evaluation (e.g. safety indicators) it is not possible to abandon the complex approach based on the combination of exact methods and an engineering approach.

SÚJB participation in the process of accession to EU

In the field of the Czech Republic's preparation for the accession to EU, SÚJB partly fulfilled assignments which resulted from the EC Regular Report and were elaborated in the Overview of remaining assignments to the Czech Republic for the accession to EU, and partly assignments resulting from EU authorities meetings. SÚJB also assisted during the elaboration of strategic documents for this preliminary period, coordinated by MZV, eventually MŽP.

In the field of nuclear safety, SÚJB's main priorities were the elaboration and submission of additional information to the Working group for nuclear questions (AQG) in the year 2002. The EU Council entrusted this group, in continuation to the Report of nuclear safety as part of the enlargement elaborated in the year 2001, to review how candidate countries coped with recommendations stated in the Report. As a result of this review the Working group summarized a new report which was reviewed by EU Council authority COREPER in June 2002. It is stated in the report that the Czech Republic fulfills the general recommendations defined in the previous report. Considering three specific recommendations addressed to Temelín NPP and Dukovany NPP the working group stated that it is ready to review other Czech information of consecutive fulfillment of precautions proposed in terms previously notified from the Czech side.

As already mentioned in Czech-German and Czech-French relations, two international seminars were held in Prague during the year on which ČEZ and its suppliers informed SÚJB experts and West European regulators (FRA, VB, SRN, IAEA) of procedure during precautions proposal prepared to solve AQG recommendations for Temelín NPP related the to concurrency of steam and feed

pipelines and to verify the functional fitness of safety valves. Discussion results within both seminars contributed significantly to the creation of SÚJB final standpoint to proposed precautions. The process of precaution preparations positively indicated that the uniqueness of each type of nuclear power plant (if a repeat of particular project is not involved) and different national approaches (including standards) do not permit a simple "European" solution for Temelín NPP. Already AQG recommendations were initiated on the basis of specific national approaches of some member countries. The final proposal, for example, is not in correspondence with a particular German approach (very strict and permitting only one of the possible solutions), but the final solution is compiled to respect safety principles included in the Temelín NPP original project, also to apply additional precautions compatible with practices in EU countries and in the USA. Recommended implementation addressed to Dukovany NPP runs in the scope of an international project associating the Czech Republic, SR and Hungary. The report of first phase realization will be submitted to EC in the first half of the year 2003.

EC office submitted information on Temelín NPP licensing and start-up in correspondence with assignment resulting from EC Regular quarterly reports.

SÚJB representatives participated continuously in negotiations with EC the integration of candidate countries into the radiation situation monitoring system operated in the Czech Republic EU – ECURIE. Preparation of a contract between candidate countries and Euratom started and shall be the legal basis for candidate countries integration into ECURIE. SÚJB representatives also participated in a meeting of the subcommittee of the Commission for power engineering, transportation and environmental affiliation, a session of EC working group "Nuclear Regulatory Working Group (NRWG)" and a session of ACCESS project control committee. This project was established to evaluate the situation in guarantee application in candidate states and to prepare training for holders of permission for the treatment of nuclear materials in these states so they could fulfill the requirements of the EURATOM guarantee system after state accession in EU. SÚJB organized three seminars in the year 2002 for permission holders who treat nuclear materials and who will submit information to the Euratom guarantee office.

Another office activity related to the Czech Republic's preparation for accession to EU was, besides ES and Czech law correspondence in radiation protection and guarantees described in the report legislative part, an update of Implementation plans which determine steps for the application of requirements specified by EC regulations for radiation protection. Meetings with involved departments were held which were for the implementation of control mechanisms for radioactive substances and radioactive waste movement across the border. Meetings with involved departments for the implementation of control mechanisms related to foodstuff and feed contaminated with radionuclides continued simultaneously.

Revision of EC regulation translations was performed in cooperation with the Czech Government's Compatibility Department and an update of information of EU regulations maintained in Government database (ISAP) continued. SÚJB internal page - European Union was also updated and complemented continuously, where the database with EC regulations, implementation plans and other information related to EU are available for SÚJB employees.

SÚJB assisted in the process of the Czech Republic's preparation for accession to EU partly in activities coordinated by MZV and partly integrated into structured dialog with relevant EC general directories (DG ENV and DG TREN). Within this dialog SÚJB representatives participated in regular actions during the year. CONCERT group regular meetings were involved, in particular, CONCERT being the platform for experience exchange and correspondence of regulator practices in EU countries and Middle and Eastern Europe candidate countries. SÚJB will be an organizer of this group meeting in May of this year.

PHARE

It was a success, in cooperation with the new EC administration for PHARE program control in nuclear safety, to bring back projects with already-approved program and financing. The following projects are involved for which the Financial Memorandum for "nuclear safety" was signed in May 2002:

- Installation of RODOS system for early warning and emergency preparedness in the Czech Republic – the project includes assurance, installation and start of hardware, software and peripheral equipment activity in SÚJB with the emphasis on early response in case of emergency events;
- Boric acid dilution and accidents during the reactor low powers and outages – the object of this project is SÚJB support during evaluation of safety analysis for necessity of VVER-440/213 reactors licensing process.

The following projects prepared within the Phare 2001 "nuclear safety" program listed below are now in the state of contract conclusion:

- Reappraisal of the mechanical properties of reactor internal parts based on an examination of exposed samples from the dismantled reactor in Greifswald – the project comprises two parts, one is the determination and evaluation of exposed material physically-mechanical properties from VVER reactor in Greifswald, while the second is the methodology built up for the experimental part of work and integration of a database of resultant properties into regulation procedures used in the Czech Republic;
- Evaluation and validation of computer codes for nuclear reactors' thermohydraulic calculations based on experimental data – the project consists of two parts as well, and deals with experimental research of critical thermohydraulic processes which can begin in the VVER-1000 reactor primary and secondary circuit during temporary and emergency situations and evaluation by means of computer codes including the appraisal of their validation and robustness.

SÚJB activity within the PHARE "nuclear safety" program contained assignment preparation and vindication for two other projects from the 2002budget. These are the following:

- VVER reactor pressure vessel integrity evaluation – the objective of the project is to prepare and validate procedures for reactor pressure vessel integrity evaluation including epithelium made of austenitic steel also in case of the occurrence of defects, while the stress lays on the practical behavior of pressure vessel epithelium during the pressure and thermal shock;
- Qualification of nondestructive testing and control – the intention is to strengthen NPP nuclear safety level in the Czech Republic by the qualification of

nondestructive testing (NDT) methods according to ENIQ and IAEA methodologies for the realization of regular controls. The project includes the proposal and production of testing files, implementation of modern NDT methods, development, and the optimization of inspection procedures including practical test evaluations.

CTBTO preliminary committee

SÚJB continued in the fulfillment of the national office function in a sense of the Contract of Comprehensive Nuclear-Test-Ban Treaty CTBT (Comprehensive Nuclear-Test-Ban Treaty) in the year 2002. During the monitored period SÚJB representatives, together with representatives of the Czech Republic Permanent Mission at UN and other international organizations in Vienna, participated in meetings of the Contract working authorities and in cooperation with ÚFZ (Country Physics Institute) in Brno and SÚRO (State Institute for Radiation Protection) in Prague ensured the fulfillment of commitments which result from this Contract for the Czech Republic.

CTBTO, with Headquarters in Vienna, include the international monitoring system (IMS – International Monitoring System) consisting of 321 monitoring stations and 16 radionuclidic laboratories. Measured data from the global system of 50 primary and 120 subsidiary seismologic stations, 11 hydro-acoustic, 60 infra-acoustic and 80 radionuclidic stations are gathered, archived and evaluated in the international data centre (IDS – International Data Centre). One of the subsidiary seismologic stations with AS026 label is placed in Vranov at Brno in the Czech Republic and is operated by ÚFZ. This station was certified successfully by experts from CTBTO in the year 2002 which is a result of the qualified and professional approach of ÚFZ. Considering an almost 100% operational reliability of this station up to now, the results from there are very often desired not only by the Headquarters in Vienna, but also by other applicants all over the world.

Other multilateral activities

SÚJB is a founding member of the Regulators Association of countries which operate VVER reactors. This Association was established in 1993 to support the increase of nuclear safety and radiation protection level by using common experiences, information exchange and mutual effort coordination during its assurance. SÚJB representatives participated in the Association's annual meeting in the year 2002, organized by Hungary. Czech experts' working activities in the Forum working groups continued during the year (e.g. in the group for solution of fuel cycle end problems).

9. Information provided in accordance with law no.106/1999 of Coll. of free access to information

In accordance to the above mentioned law 128, applications of the provision of information were submitted to the State Office for Nuclear Safety in the year 2002

from physical or legal persons. Only in one case was the application cleared by issuing the decision of not providing information, while the addressee submitted an appeal against such decision. The appeal was not accepted as valid by the commission for appeals and the original SÚJB decision was accepted. SÚJB received the Supreme Court ruling dated July 31, 2002 on October 2, 2002, which halts the lawsuit of the Calla Association for Environmental Protection's prosecution concerning the withholding of information. No judicial decision towards SÚJB was issued during the year 2002 for non-adherence to this law.
Information was required (and also provided) in all forms accepted by law: verbally personally, by telephone, by e-mail or in written form. The applications could be divided thematically as follows:

a) problems concerning Temelín NPP start-up (20 applications)
b) problems concerning radiation protection and radiation situation monitoring on the territory of the Czech Republic (62 applications)
c) the Atomic Law amendment (15 applications)
d) others (31 applications).

SÚJB's Internet page www.sujb.cz serves as a supplement to information provided in the forms mentioned above. 112,504 accesses from 7,188 computers were registered in the period of September 2002 – January 2003. The widest public has access through the page to recent events of SÚJB activities and to basic information of SÚJB status in the scope of civil service, organizational structure, and rule of law which SÚJB uses. The most important contact addresses are stated as well. The Internet page offers also many documents and reports from the field, on which the office concentrates. The Czech Republic's National Report could be given as an example processed for the Convention of nuclear safety or annual report requirements submitted to the Czech government. The majority of information is available both in Czech and English.

SÚJB representatives, in accordance with the obligation determined by the Atomic Law to SÚJB, informed county council chiefs of radioactive waste treatment on the territory administrated by them and of nuclear fuel transports into Czech nuclear facilities. Meetings with municipal government and district representatives were held within assurance of emergency preparedness in locations of nuclear facilities.

SÚJB fulfills its informational obligations to the public in the form of issuing bimonthly "Nuclear energy safety" and non-periodical series "Nuclear facilities safety", where all general information related to nuclear safety and detailed requirements and instructions for its assurance is published. The applicant can obtain detailed information of both the content of periodicals and acquisition possibilities at the following address: Nuclear Information Institute, Eliška Přemyslovna street, Prague 5 - Zbraslav.

SÚJB informed ČTK service and other news media of facts which come under its force during the year.

Abbreviations & Acronyms

AČR	Czech Republic Army
ALARA	As Low as Reasonably Achievable
AMS	Authorized Metrology Center
ASLAB	Center for Laboratory Competence Assessment
ASŘTP	Automated Systems of Process Control
BD	(Main) Control Room
BS	Safety System
BTWC	Convention on Prohibition of Bacteriological & Toxin Warfare
CRPO	Central Registry of Occupational Exposure
CTP	Whole-Body Counter
CWC	Convention on Prohibition of Chemical Warfare
ČHMÚ	Czech Institute for Hydrometeorology
ČIA	Czech Institute for Accreditation
ČLS J.E.P.	Czech Medical Society of J.E. Purkyně
ČMI	Czech Metrology Institute
DG(S)	Diesel Generator Plant
DKP	Lower End Position
DPZJ	Partial Program for Quality Assurance
DRU	Diagnostic Reference Level
EDU	ČEZ, a.s., Dukovany Nuclear Power Plant (NPP)
EK	European Commission
EOAR	Radon Effective Activity Concentration
ES	Power Start-Up
ESTRO	European Society for Therapy and Radiation Oncology
ETE	ČEZ, a.s., Temelín Nuclear Power Plant (NPP)
EZS	Electronic Safety System
F	Imbalance Coefficient of Rn & Rn Decay Products
f_p	Free EOAR Component (for EOAR see above)
FJFI ČVUT	Nuclear Engineering Faculty of Czech Technical University
FRO	Film Rotary Evaporator
FS	Physical Start-Up
GO	Overhaul
GSM	2nd Generation of Cellular Phones as Used in CR
HCČ	Primary Coolant Pump
HDR	High Dose Rate
HMG	Schedule
HNČ	Main Feedwater Pump
HO	Emergency Protection
HPK	Main Steam Header
HRK	Safety, Control and Shim Assemblies
HS	Hygiene Service
HÚCO ČR	Main Office of CR Civil Defense
HVB	(Main Production) Unit
IAEA	International Atomic Energy Agency
IGA	Internal Grant Agency
INES	International Nuclear Event Scale
IPV KO	Pulse Safety Valve in Pressurizer

IPVZ	Post-Graduate Education Institute
IRIS	Integrated Radiation Information System
IS RMS	Information System of Radiation Monitoring Network
IV	Institutional Research
IZ	Ionizing Radiation
JB	Nuclear Safety
JE	Nuclear Power Plant
JEZ	Nuclear Power Plant / Facility
JZ	Nuclear Plant / Facility
KKC	Emergency Coordination Center
KŠ	Emergency Headquarters
KV	Complex test / testing
kVp-metr	High-voltage Surge Meter
LaP	Safe Operation Limits & Conditions
LDR	Low Dose Rate
LEGeD	Low Energy Germanium Detector
LET	Linear Energy Transfer
LCHMO	Laboratory for Chemical Monitoring & Protection
LRKO	Laboratory for Monitoring of Environment Radiation
MAAE	Czech equivalent of IAEA (for IAEA see above)
MAPE	Former uranium reprocessing plant (derived from Magnesium Perchlorate)
MBA	Material Balance Area
MEZ	Power Limiter
MF	Ministry of Finance
mFISH	Multicolor Fluorescent Hybridizing in situ
MMKO	Air Monitoring Point
MO	Ministry of Defense
MP	Intermediate Range
MS	Ministry of Justice
MSVP	Interim (Spent Fuel) Storage Facility
MV	Ministry of Interior
MV-GŘ HZS ČR	Ministry of Interior - CR Fire Brigade Headquarters
MZ	Ministry of Health
MŽP	Ministry of Environment
NEA/OECD	Nuclear Energy Agency OECD
NPT	Nonproliferation Treaty
OAR	Radon Activity Concentration
OKZCHBZ	Department for Inspection of the Adherence to the Ban on Chemical and Biological Warfare
OPCW	Organization for the Prohibition of Chemical Weapons
ORZ	Open Radionuclide Source
PCO	Centralized Protection Console
PERIZ	Periodic Integral Tightness Testing
PFDE	Photon Dose Equivalent Rate
PG	Steam Generator
PKV	Pre-complex test / testing
PNČI	HRK Frequency Converter (for HRK see above)
PoZJ	Quality Assurance Procedure
PpBZ	Final Safety Analysis Report

PPS	Share in Causation
PSD	Passive Trace Detectors
PS-ZRAO	Process system - Radioactive Waste Treatment
PZJ	Quality Assurance Program
QA/QC	Quality Assurance / Quality Control
RAO	Radioactive Waste, Radwaste
RC	Regional Center
RČA	Fast-Acting Valve
RDPO	Registry of Permit Holders and Reporting Entities
RMS	Radiation Monitoring Network
RO	Radiation Protection
ROR	Reactor Scram
RZ	Registry of Ionizing Radiation Sources
RZV	Fast-Closing Valve
SIS	Specialized Inspection Teams
SKŘ	Instrumentation and Control, I&C system
SMS	SMS message (Short Message Service) conveyed through Global System for Mobile Communication (GSM)
SROBF ČSL	Society for Radiation Oncology, Biology and Physics
SUL, o.z.	Administration of Uranium Deposits, s.p. DIAMO Branch Office
SÚJB	State Office for Nuclear Safety
SÚJCHBO	State Institute for Nuclear, Chemical and Biological Protection
SÚRAO	Administration of Radioactive Waste Repositories
SÚRO	State Institute for Radiation Protection
SVZ	Early Warning System
TBN	Turbine Supply System
TG	Turbine Generator
TGO	Type-Related Overhaul
TLD	Thermoluminescent Dosimetry
TŘ	Design or Engineering Solution
TSFO	Engineered Safety Features
TÚU, o.z.	Uranium Mining and Treatment Plant, s.pl DIAMO Branch Office
UD	Uranium Mines (Comp.)
URAO	Radioactive Waste Repository
URZ	Sealed Radionuclide Sources (of radiation)
US DOE	US Department of Energy
US NRC	US Nuclear Regulatory Commission
ÚJF ČAV	Nuclear Physics Institute of Czech Academy of Sciences
ÚJV Řež, a.s.	Nuclear Research Institute Řež, a.s.
ÚNMZ	Office for Standardization, Metrology and Testing
VAO	High-Level Radioactive Waste
VHP	In-House Emergency Plan
VK	In-Core Inspection
VKRH	Government Commission for Radiation Accidents
WEC	Westinghouse Electric Corporation
WENRA	Western European Nuclear Regulators Association
ZIZ	Source of Ionizing Radiation
ŽP	(Living) Environment