ANNEX 6 Evaluation of the Safety Performance Indicators Set
(year 2015)

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A. INTRODUCTION

State Office for Nuclear Safety (SUJB) executes the state administration and supervision of the utilisation of nuclear power and ionising radiation in order to assure achieving a required safety level. As the focus of the supervision consists in the evaluation and assessment of nuclear safety related activities and their results, SÚJB annually evaluates an achieved level of nuclear safety of operation of Dukovany NPP and Temelín NPP by using Safety Performance Indicators.

The Safety Performance Indicators evaluate four areas of the NPP operation:

1. Events,
2. Safety Systems Performance,
3. Barriers Integrity,
4. Radiation Protection.

The evaluation results of Safety Performance Indicators in the form of graphs for the monitored period (2010 – 2015 for Dukovany NPP and 2010 – 2015 for Temelín NPP) are given in appendices. The graphs mostly represent local values in the form of sum totals or averages of the unit values. Only for Safety System Unavailability, the indicated values are also at the level of the systems and for Barriers Integrity at the unit level.

Input data for the evaluation were acquired both from documents submitted by the operator and by SÚJB supervisory activities at Dukovany NPP and Temelin NPP.

B. EVALUATION OF THE SET OF SAFETY PERFORMANCE INDICATORS FOR DUKOVANY NPP

This section includes an evaluation of particular indicators of the monitored areas of operation of Dukovany NPP and their graphic representation is shown in Annex – Part I.

Almost all operational – safety indicators in 2015 are in a way "distorted" by serious findings in the area of incorrect or insufficient recording of welds. SONS was informed of this fact by the operator in September 2015. Based on this finding were 3 Units of Dukovany NPP shut down.

It was reveal that for years across all systems and all Units Dukovany NPP welded joints conditions were recorded by incorrect documentation. Based on the above stated findings the outage for refueling and overhaul of Unit 1 Dukovany NPP was extended. Unit 2 and 3 were shut down so that the most important welded joints related to nuclear safety could be reviewed and possibly corrected.

If we do not take into account safety indicators distortion which are due to the shutdowns for welds checking, still the general assessment and evaluation of Dukovany NPP set of operational safety indicators evaluated for 2015 show that the overall status of nuclear safety in the production of electricity at Dukovany NPP continues to remain at a high level.

1. Events

Group 1.A – Reportable events

The basis for the group 1.A indicators is the evaluation of reportable events according to the NPP Event specification. The indicator 1.A.1 "Number of Reportable Events" was included into the set of Safety Performance Indicators in 2003 and it superseded indicator "The Number of Safety Related Events".

There were 49 events assigned to the indicator 1.A.1 "Number of Reportable Events" (graph 1.A.1) in 2015. The highest value of this indicator in past six years, 61 events, was achieved in 2011, which was the highest value since 2003.

The trends of BSE (Bellow Scale Events) and SSE (Safety Significant Events) values are shown on graph of the indicator 1.A.1. The number of events evaluated according to the International Nuclear Event Scale (INES) for the significant part of the monitored period shows a steady state with an increase of approximately 100% in 2007 and 2011 and return back in the upcoming years.

The indicator "Human Factor" (graph 1.A.2) by means of index HFI expresses a share of human failures in total number of reported events. This indicator both in the number of the events affected by human factor and in its index in the period under consideration in the last years (2012 – 2015) stabilizes around the value of 34/17.

Group 1.B – Actuation of the protection and limitation systems

Results of the indicator "Unplanned Unit Scrams" are shown on graph 1.B.1,2. There is written unplanned automatic reactor scram and unplanned manually shutdown of the reactors of Dukovany NPP. In the last 5 years there were no automatic or manual fast shutdown Dukovany NPP reactors.

The number of actuation of automatic power reductions by RLS3 during the past three years has decreased compared to the year 2012. The results of indicator "Automatic Power Reduction/Limitation" are shown in a common graph 1.B.3-5.

Due to eliminating the cause of an increased number of "Control Rod Drops" (caused by insufficient cooling of newly installed components of reactor control system) the corresponding scrams were practically excluded. There were no Control Rod Drops during past previous five years, merely in 2015 there were two scrams (graph 1.B. 6).

Group 1.D – Limits and Conditions

The indicator "Violations of the Limits and Conditions" (graph 1.D.1) fluctuates from zero to three events per year and unit.

The indicator "Exemptions from the Limits and Conditions" (graph 1.D.3) in 2015 compared to 2014 decreased by approximately one half. The reason for this compared to previous years the high number of exemptions from the L&C was especially realization of actions "Stress-Tests" after the events at Fukushima NPP and implementation of repairs ESW systems.

2. Safety Systems Performance

Group 2.A – Safety System Unavailability

The group is monitored by means of indicator "Safety System Unavailability" for specific safety systems, see graphs 2.A.1.a – g.

The graphs of the system sub-indicators show a slight increase of all safety systems unavailability in 2014 and 2015. It is not surprising as these parameters increase corresponds to the implementation stress-test masures and to the repair work of the systems ESW. From the graphs sub-indicators for individual systems (2.a.1-g) it be concluded that in the following years lower values are expected similar to those of years before 2014.

Group 2.B – Failure of safety systems

According to the indicator "Starting Failures of Safety System" (graph 2.B.1), in 2015 there was no failure of Safety Systems. Other monitored systems did not fail in their start-up. Similarly, the behaviour of safety systems in operation is monitored in the indicator 2.B.3. No failure occurred in safety system operation since 2005.

3. Barriers Integrity

Group 3.A – Nuclear fuel

The condition of nuclear fuel is monitored by the indicator "Fuel Reliability Index" (FRI, graph 3.A.1) and the indicator "The Number of Leaky Fuel Assemblies" (graph 3.A.2).

The fuel reliability formula is based on the empirical formulas and its results thus must be considered in terms of possible failure load. In practice, two or three levels of the values of the Fuel reliability factor are assessed:

- more than 19 Bq/g – the reactor core contains, with great probability, one to two defects;
- less than 19 Bq/g – the reactor core does not contain, with great probability, any fuel defect; all design values of the Fuel

– reliability factor less than 0.04 Bq/g are just corrected to the limit 0.04 Bq/g by reason of limited operation of the empirical formulas.

Out of the comparison the graphs of these two indicators their interconnection is apparent. Annual values FRI factor at Dukovany NPP very low long-term, the highest value of FRI 0.91 Bq / g was recorded in 2015for 1st Unit. This value is still far below the value which indicates leaking fuel.

During the whole operation time of Dukovany NPP were from the operation excluded only 7 fuel assemblies.

Group 3.B – Containment

Graph 3.B.1 of the indicator evaluates, through the results of the Containment periodic integral tightness testing, the tightness condition of hermetic areas. Tightness tests with the period of 2 years have been ongoing since 2011, for Units 1 and 3 in odd years, and for Units 2 and 4 in even years. The year 2015 confirms trend of systematic increase of Dukovany NPP unit tightness, which has been recorded on all four units since 2001, except for two minor deviations. All time low leakage values for 24 hours are recorded on Unit 1 and 4 during the Periodic integral tightness testing. In terms of containment tightness, the best results are recorded on Unit 4 on a long-term basis.

Out of order Containment periodic integral tightness testing test was conducted on Unit 2, where in the framework increasing the seismic resistance of Units was work and interventions into the hermetic envelope of hermetic areas. During the test Containment periodic integral tightness testing Unit 2 was measured at the lowest value of 3.657% / 24 h, which is approximately a quarter of permissible values. In 2016, the Unit 2 NPP performed also extended test Containment periodic integral tightness testing the same extent as a test on Unit 1 in 2015.

4. Radiation Protection

Group 4.A – Staff

The indicator "Collective Effective Dose per Unit" (graph 4.A.1) monitors collective effective dose of NPP staff, suppliers and visitors converted per one unit. In 2015 the indicator included 642 radiation NPP staff and 2,261 workers of contractors. The indicator "Collective effective dose per Unit" ranks Dukovany NPP among the best NPP in the world.

The total collective effective dose for all 4 Units of NPP Dukovany for NPP staff and suppliers is in the graph 4.A.2 "Collective Effective Dose". The graph shows that the "Collective Effective Dose" of radiation NPP staff stable at around 10% and about 90% of the collective effective dose of radiation employees of contractors (this is due to the fact that repairs are carried supply activities).

At the indicator "Specific collective Dose per Capita" (graph 4.A.3), fluctuated between 0.10 and 0.07 mSv/year at the NPP staff, and between 0.42 and 0.25 mSv/year at the suppliers.

Indicator "Maximum Individual Effective Dose" (graph 4.A.4) was fluctuated in a similar way as other indicators. Both mentioned indicators also document that supplier’s staff are exposed to radiation more than Dukovany NPP staff (this is due to the fact that repairs are carried supply activities).

The indicator "The Number of Workers with Special Decontamination" (graph 4.A.5) shows permanently very low level and documents a high safety level at work with ionizing radiation sources of more than 1,800 radiation employees of Dukovany NPP. In 2011 and 2015, four employees had to be subject to special decontamination, which are the highest number for the whole period under consideration.

Group 4.B – Radioactive Releases

The indicators "Gaseous Releases" and "Liquid Releases" evaluate the operation of Dukovany NPP in terms of radioactive releases. Their graphs 4.B.1 and 4.B.2 document that the committed effective doses from the releases are in both cases lower for the population in a calendar year than the limits (the limit for gaseous releases is 40 μSv and 6 μSv for liquid releases).

C. EVALUATION OF THE SET OF SAFETY PERFORMANCE INDICATORS FOR TEMELIN NPP

This section includes an evaluation of particular indicators of the monitored areas of Temelin NPP operation and their graphic representation is shown in Annex – Part II.

The operation of Temelin NPP was evaluated by means of safety indicators in 2015 for the tenth time. Similar statistic comparison may be performed for this period as at Dukovany NPP.

1. Events

Group 1.A – Related events

Since 2007, the basis for the group 1.A indicators has been the evaluation of reportable events according to the NPP Event specification that are evaluated in feedback process (RE – Related events) such as at Dukovany NPP. The indicator 1.A.1 "Related Events" was included in the set of Safety Performance Indicators and it superseded indicator "The Number of Safety Related Events". The biggest number of events in past six years was recorded in 2009 – 85 events. The number of events was considerably dropping till 2012 when 49 events were recorded. Number of events following the downward trend in the last four years has stabilized around a mean value of 42. Also, the number of events evaluated INES = 0 in the last four years has stabilized around a mean value of 12 and the number of events evaluated INES = 1 is stable at 1-2 event. However it is a "statistics of small numbers," so the one event can cause a "relative value of 100%."

The number of events with the influence of the human factor in 2015 was 25 out of the total 43 events, compared with 2014 decreased by 9. Despite the overall decrease in events caused by human factor from the graph shows that the human factor in one of the most significant contributors to the total number of events. This relates to new evaluating methodology of root causes, according to which the root cause analyzes the into more detail

Group 1.B – Actuation of the protection and limitation systems

There was no unplanned ROR (reactor scram on the basis of primary causes in PRPS system) in 2015 at Temelin NPP. Therefore, no actuation of ROR occurred for whole nine years period at Unit 2. At Unit 1 there was three actuation of ROR during past nine years. No reactor shutdown by LS(d) type was recorded at NPP Temelin during past six years.

From action of limitation system by other types (a, b, c) has occurred in 2015 only 3 impressing LS (a) and 8 impressing LS (b). In the long term it is the increased action LS (a) and LS (b), but this is a statistically small numbers, so that when the next few years will show whether this is the trend or just a fluctuation in the framework of a statistically small numbers (graph 1.B.3-5).

Group 1.D – Limits and Conditions

In 2015 there were 3 cases of Violation of the Limits and Conditions (graph 1.D.1). But this is "the statistics of small numbers". It corresponds to an expected average 1 violation per Unit per Year. Temelin NPP is in the long term into worldwide acceptable level.

During the last 3 years arouse in connection with the implementation so called "Action Plan" for increase nuclear safety units after the accident at the Fukushima NPP requirements for temporary changes "Exemptions from the Limits and Conditions" (graph 1.D.3).

2. Safety Systems Performance

Group 2.A – Safety System Unavailability

In the "Safety System Unavailability" (graphs 2.A.1a-g) can say that in 2015 fluctuated values of these parameters within the statistical variance.

Group 2.B – Failure of safety systems

During past 6 years, 3 causes starting failure occurred (DGS in 2013, TQx3 in 20011 and TQx4 in 2015). In 2015, there was one failure of safety systems at startup (pump 1TQ24D01 - local driver in position MAN instead AUT – also the violation LaP), see indicator "The Number of Starting Failures" (graph 2.B.1).

Failure during operation occurred in the monitored period 6 years a total of 12 cases, see indicator "The Number of Starting Failures" (graph 2.B.3).

3. Barriers Integrity

Group 3.A – Nuclear fuel

The state of nuclear fuel is monitored by the indicator "Fuel Reliability Index" (FRI, graph 3.A.1) and the indicator "The Number of Leaky Fuel Assemblies" (graph 3.A.2).

In 2010 and 2011, the supplier of fuel for Temelin NPP was changed (newly the TVSA-T type). In the "Integrity Barriers" was detected in 2015 for a total of 14 Temelin NPP leaking fuel assemblies. Compared to previous years this is the deterioration of this parameter and the Office will be in the next year to monitor the deterioration and try to determine its cause.

Group 3.B – Containment

In this group, there is only one indicator, which evaluates the results of the Periodic integral tightness testing, tightness condition of hermetic areas in graph 3.B.1. Last Periodic integral tightness testing was performed in 2015 at Unit 1 and in 2013 at Unit 2. The trend of measurements performed in previous years corresponds to design expectations as well as international experience.

4. Radiation Protection

Group 4.A – Staff

The indicator "Collective Effective Dose per Unit" (graph 4.A.1) monitors collective effective dose of NPP staff, suppliers and visitors converted per one unit. The indicator "Collective Effective Dose" (graph 4.A.2) monitors total collective effective dose of Temelin NPP in distribution of NPP staff and suppliers. The development from 2009 shows that the steady state (around which the individual annual values fluctuate) stay on.

The similar development can be also seen for indicators "Specific Collective Dose per Capita" (graph 4.A.3) and "Maximum Individual Effective Dose" (graph 4.A.4). It is apparent from all indicators, where the doses for NPP staff and suppliers are distinguished, that

exposure of suppliers' staff to radiation is much higher than exposure of Temelin NPP staff. It is caused due to the fact that general repairs are carried out by contracted supply activities.

None case in the indicator "The Number of Workers with Special Decontamination" (graph 4.A.5) in past six years documents a high safety level at work with ionizing radiation sources of approximately 1,200 radiation employee of Temelin NPP.

Group 4.B – Radioactive Releases

Graph 4.B.1 "Gaseous Releases - Committed Effective Dose" represents the exposure of individuals from the most exposed population group acquired by calculation from the authorized model for current radionuclide effluent to the air and the current meteorological situation in the evaluated year. The values show that the SÚJB annual authorized limit of 40 μSv is drawn on the level of approximately 0.1% in the last years.

Graph 4.B.2 "Liquid Releases - Committed Effective Dose" represents the exposure of individuals from the most exposed population group acquired from the authorized model for current radionuclide effluent to the stream and the current hydrological situation in the evaluated year.

The effective dose from discharges into waterways is affected by the average annual flow of the river Vltava.

D. CONCLUSION

Based on the results of particular Safety Indicators for 2015 it may be stated that the previous high level of nuclear and radiation safety in power generation at **Dukovany NPP** was confirmed in all monitored areas.

From the results of the evaluation of each operational - safety indicators and their trends can be seen that in 2015 had a significant influence on the operational - safety indicators identify the problem the showing of quality of welded connections on both nuclear power plants Dukovany NPP and Temelin NPP and the related extension of unit outages.

In terms of trends in each operational - safety indicators can be concluded that no significant deterioration in any of the indicators. The deterioration operational - safety indicators occurred only in the indicators associated with exemptions limits and conditions for the realization of actions arising from the safety analysis of NPPs after disaster Fukushima NPP, when there was a reassessment of nuclear safety and effort to increase nuclear safety at all in the world of operating nuclear power plants, including Dukovany NPP and Temelin NPP. These actions but after implementation consequently enhance nuclear safety. After their implementation, in which mostly occurred authorized extension of unavailability safety systems, we can expect in the coming years, the indicators connected with them get back into the normal range in the past time.

Another significant effect on operational - safety indicators was an event that occurred at Unit 2 Temelin NPP - "intermediate circuit leaks in SG". During this event has broken vent I. O. and escape through activities II. O. up to the roof of the engine room and the area is outside. Its influence is visible especially in the operational – safety indicators area of radiation protection.

Based on the above mentioned results of the indicators of the area "Radiation Protection" it may be stated that radiation protection assurance at Dukovany NPP and Temelin NPP are on a high level. The values expressing collective and individual effective dose probably stabilised.

Both liquid and gaseous effluents are maintained on a very low level.

The assessment of operational safety indicators at Dukovany NPP in 2015, shows that all indicators were assessed in all evaluated areas of the expected values (taking into account the long-term forced shutdown of 3 units for dealing welds).

Also, graphs of individual operation - safety indicators in 2015 for Temelin NPP show that even at this locality reach nuclear and radiation safety of the NPP to a stable high level. Development of monitored indicators in 2015 evaluated as steady with some indicators in the longer term we see positive trends.

The above information and evaluating the results of monitoring individual areas set of operational – safety indicators provides a good and sufficient overview of the status and ensuring of nuclear safety and radiation protection during operation of the Dukovany NPP and Temelin NPP. The values of individual indicators for 2015, that could signal a worsening trend and could be the risk for future, should continue to pay special attention to and within the inspection activities. This includes still large influence of the human factor on the number of events at NPP.

In 2015 compared to previous years indicator leakage fuel assemblies deviates for Temelin NPP. Leaks were found on the fuel assemblies after two fuel cycles. Leaking fuel assembly is associated with higher concentrations of radioactivity in I. O. This is connected with the necessity of its removal and in the final stage of its processing and storage. However, they was not a significant radiation load. SONS will continue to pay increased attention to the activities of the operator, aiming to reduce the number of leaky fuel assemblies.

The above summary of the results of particular areas of the set of safety indicators provided a sufficient overview of the state and assurance of nuclear and radiation safety in operation of Dukovany and Temelin NPPs. Within the inspection activities, the inspectors from the State Office for Nuclear Safety will pay more attention to the reasons for the growing trend as well as the proportion of LF events.

E. ABBREVIATIONS:

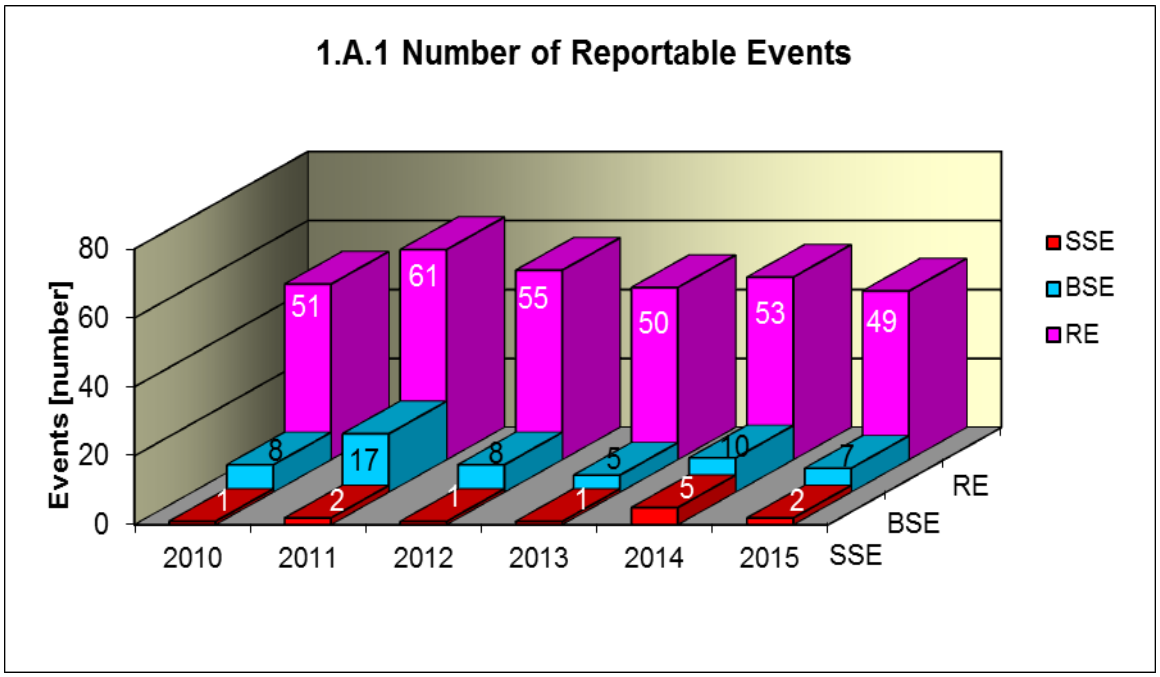
AŠP	Activated and fission products
AZ	Reactor core
BL	Safety limit
BS	Safety system
BSVP	Spent fuel storage pool
ČEZ	Business name of the Czech utility - joint stock company ČEZ, a. s.
DG	Diesel generator
E	Individual effective dose
EDU	Dukovany nuclear power plant
ETE	Temelin nuclear power plant
GO	Overhaul
HA	Hydro-accumulator
HMG	Time schedule
HP	Hermetic premises
HN PG	Steam generator auxiliary feed-water system (Dukovany NPP)
INES	International Nuclear Event Scale
JB	Nuclear safety
JE	Nuclear power plant
LIJB	SÚJB local inspectors
LS (a,b,c,d)	Limitation system (various actuation functions)
LaP (L&C)	Limits and Conditions
LPP	Limiting condition for operation
NT	Low-pressure system
NOS	Protection system setting
OKJZ	Nuclear installation inspection section
OROPC	Fuel cycle radiation protection section
OZIK	Repetitive containment integrity test
PG	Steam generator
PBU	Safety indicator(s)
PERIZ	Periodic integral tightness testing
PERZIK	Periodic containment integrity test
PRPS	Primary reactor protection system
RB	Reactor unit
RC	Regional center
REAZNII	Automatics of emergency power system – category II
ROR	Reactor scram
S	Collective effective dose
SAOZ (SHCHAZ)	Emergency core cooling system
SHN PG	Steam generator emergency feed-water system (Dukovany NPP)

SW	Software
SZB	Safety assurance system
TJ	High-pressure emergency core cooling system
TH	Low-pressure emergency core cooling system
TQ	Dukovany NPP spray system / Temelin NPP emergency core cooling systems and spray system
TX	Emergency steam generator feedwater system (Temelin NPP)
VT	High-pressure system
ZIK	Structural over-pressure test
ZKOB	Safeguards and protection testing

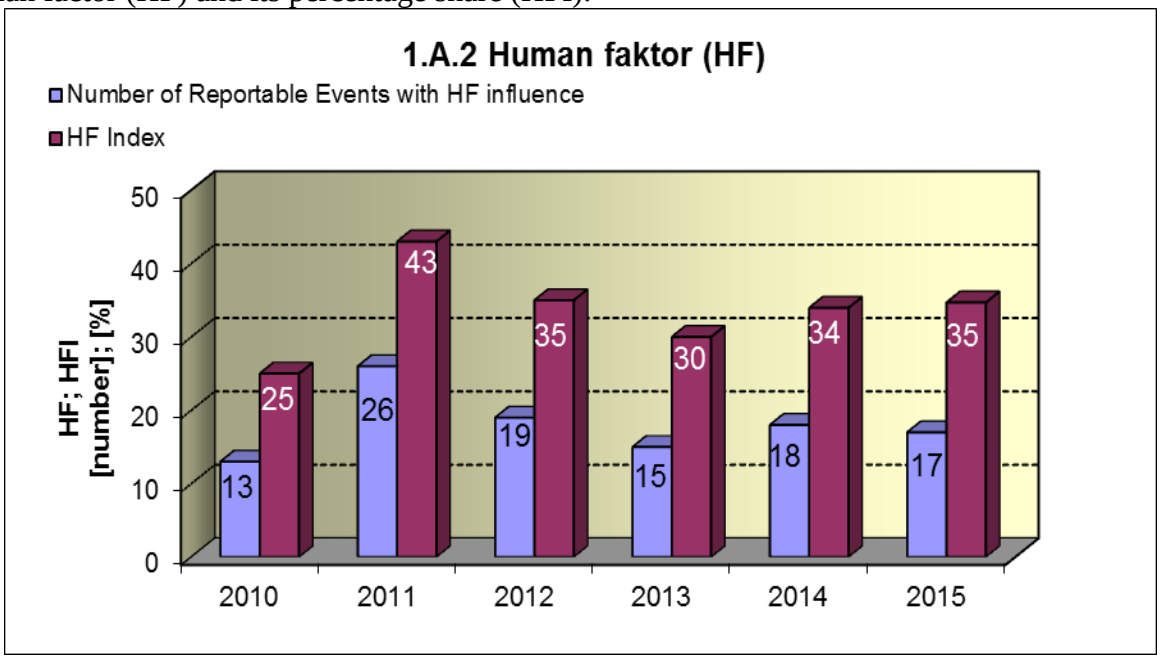
1. Significant Events

1.A Reportable events

Graph of indicator 1.A.1 monitors the development of number of reportable events (RE) including its division according to the evaluation of the International Nuclear Event Scale (INES) into significant events (SSE, INES > 0) and the below scale events (BSE, INES = 0).

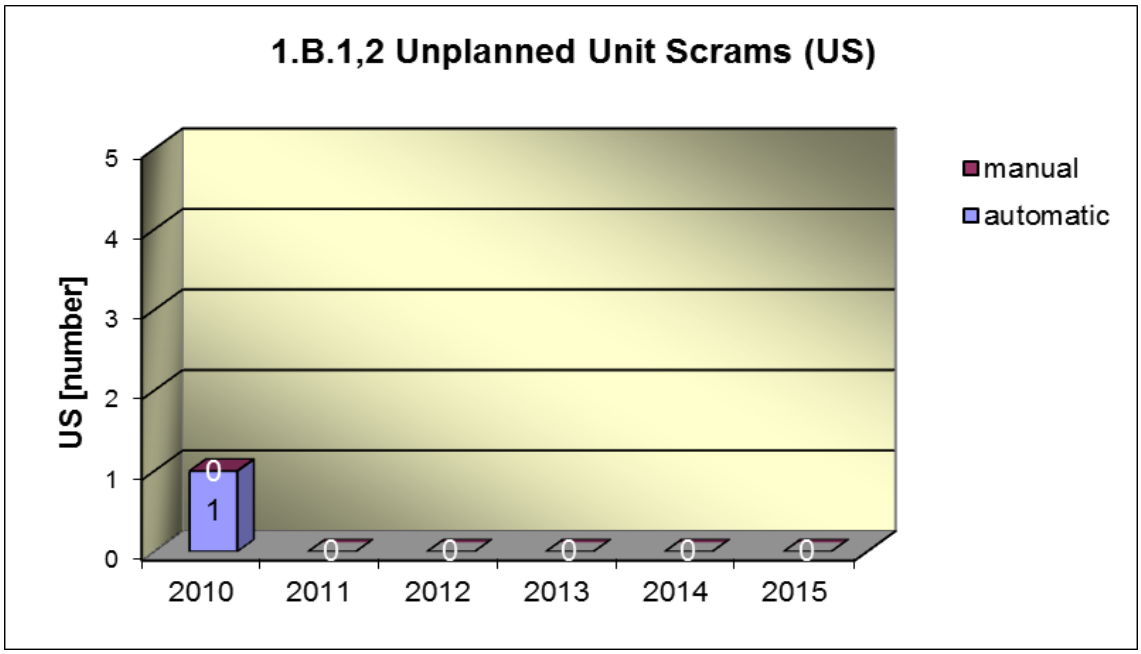


Graph 1.A.2 evaluates the influence of the human factor upon occurrence of reportable events. The indicator is expressed by the number of the reportable events with an influence of human factor (HF) and its percentage share (HFI).

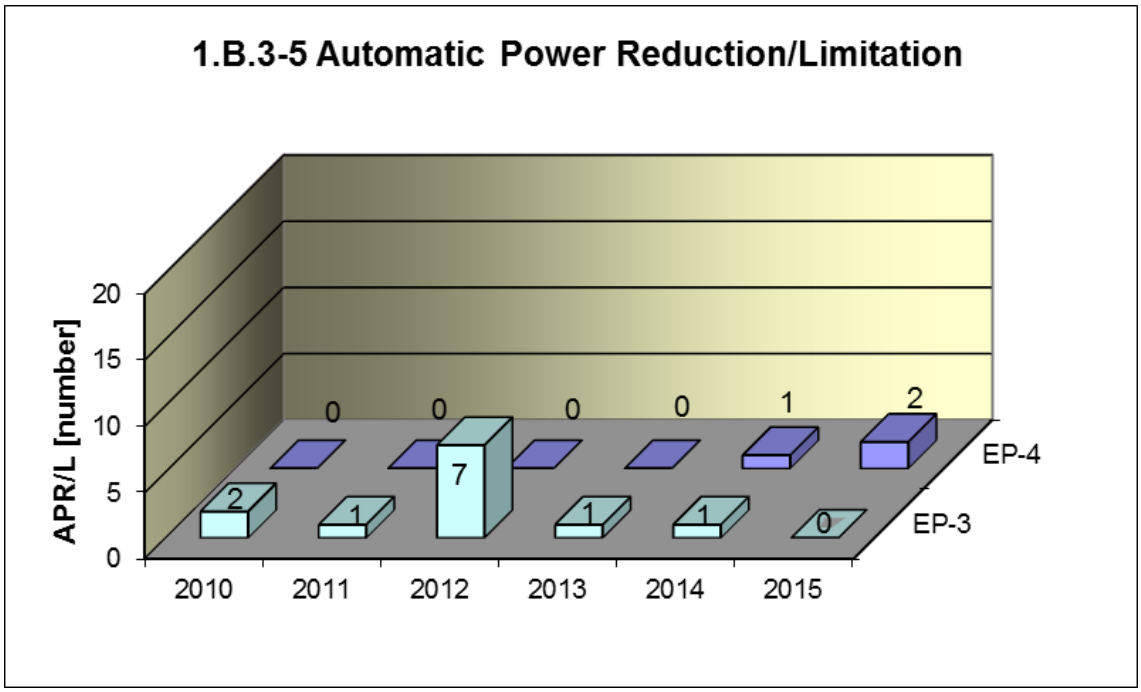


1.B Actuation of the protection and limitation systems

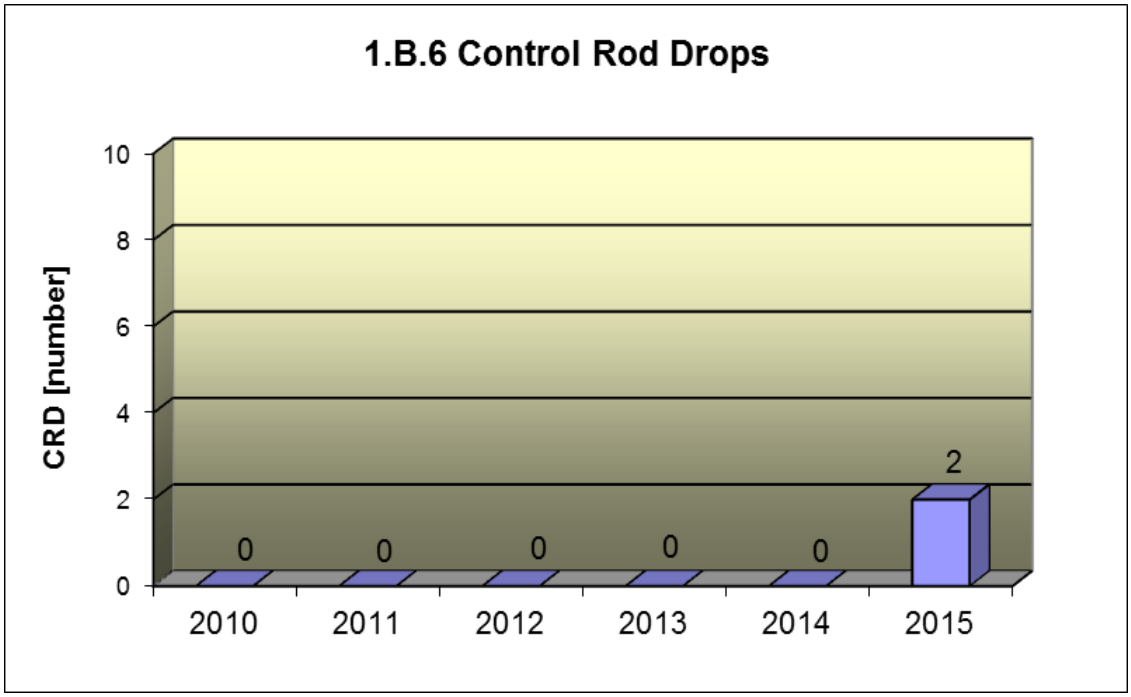
Graph 1.B.1,2 summarises the total number of unplanned unit scrams (US) (reactor in MODE 1 or 2) with resolution of manual and automatic shutdown. The term unplanned means that the scram was not an expected part of the planned test.



A common graph of indicators 1.B.3-5 presents the number of unplanned automatic power reduction (APR) by emergency protection of the 2nd – 4th type (HO-2, HO-3 a HO-4).

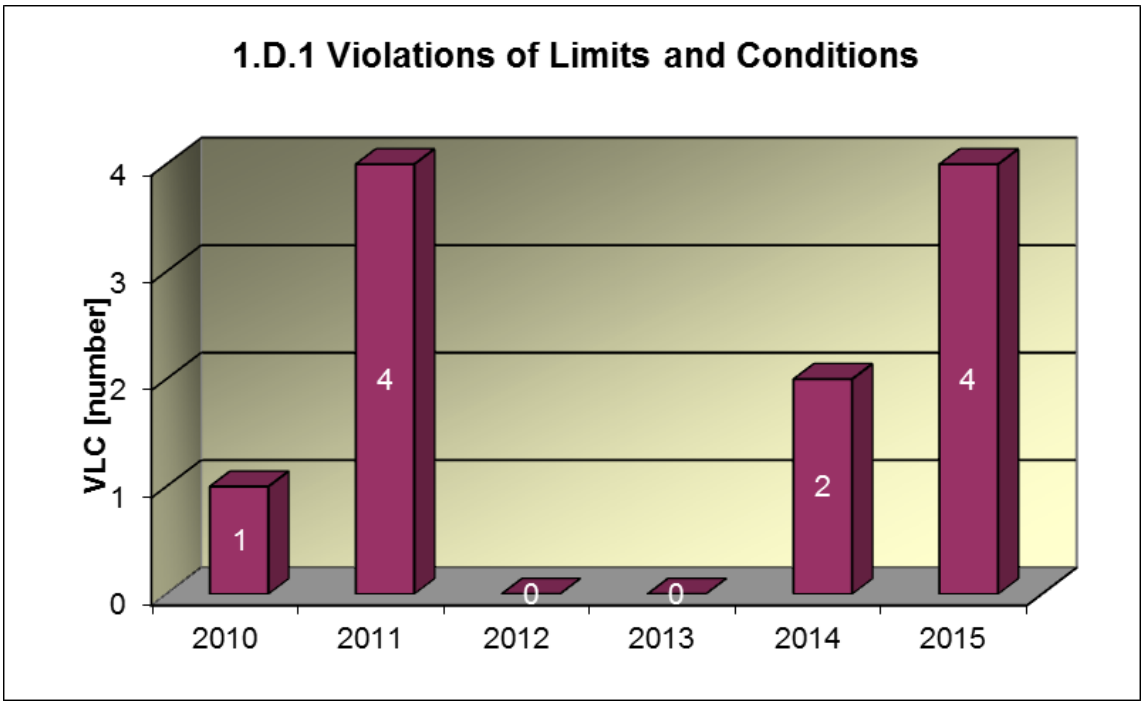


Graph 1.B.6 presents the development of the number of control rod drops (CRD).

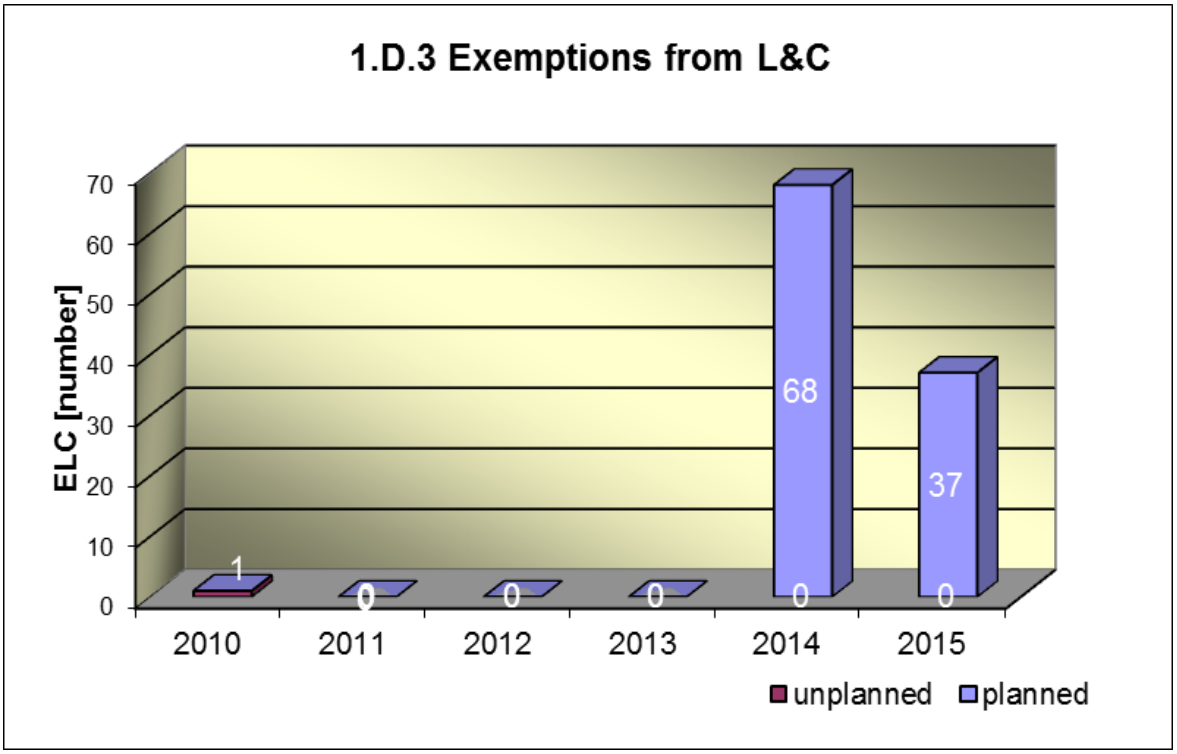


1.D Limits and Conditions

Graph 1.D.1 summarises violations of the Limits and Conditions (VLC) detected by the Regulatory body or reported to the Regulatory body by the licensee.



Graph 1.D.3 summarises the number of planned and unplanned exemptions from the Limits and Conditions (ELC) approved by the Regulatory body including those requiring SUJB approval and however not drawn for various reasons.



2. Safety Systems Performance

Area 2 monitors and evaluates availability of the following safety systems (BS) in group A:

- diesel generators	**DG**
- high pressure emergency core cooling system	**TJ**
- low pressure emergency core cooling system	**TH**
- spray system	**TQ**
- hydro-accumulators	**HA**
- steam generator auxiliary feed-water system	**HN PG**
- steam generator emergency feed-water system	**SHN PG**

and in group B failure of diesel generator (DG), high pressure emergency core cooling system (TJ), low pressure emergency core cooling system (TH) and spray system (TQ) in starting and operation.

2.A Safety system unavailability

Unavailability of particular safety systems (SSU_S) - graphs 2.A.1.a – g, is defined as the ratio of the total time of unavailability of an evaluated safety system to the total time when its availability was required. In addition, these combined graphs express the ratio of unavailability of respective safety system to the "general" safety system of the site.

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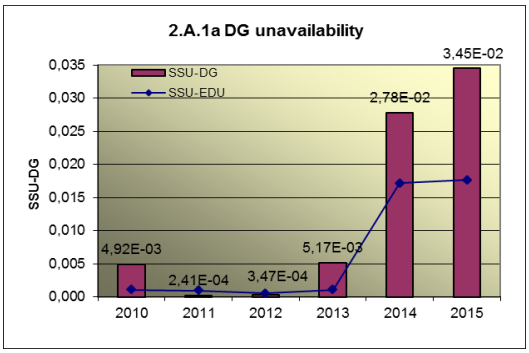
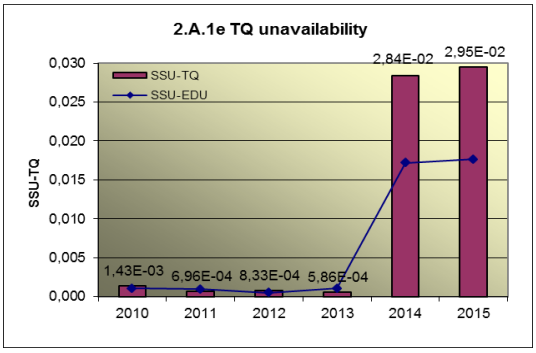
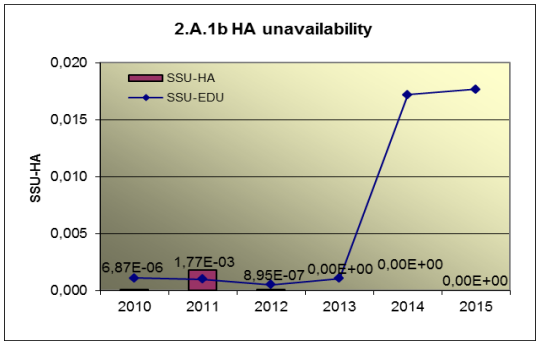
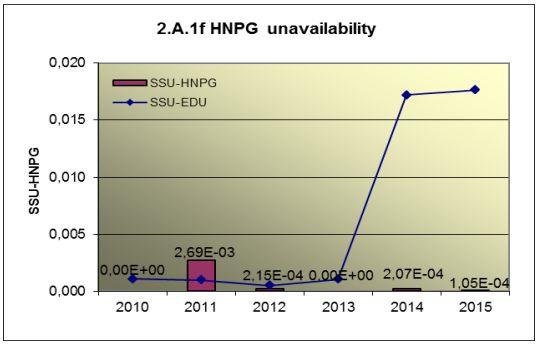
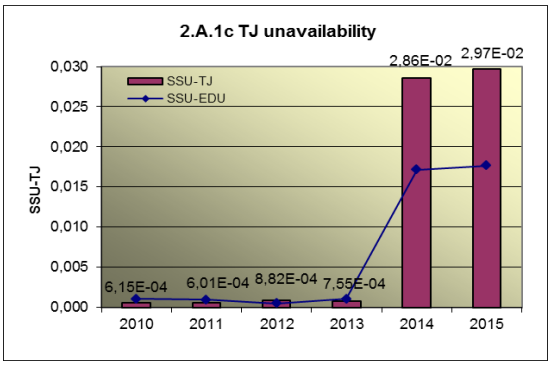
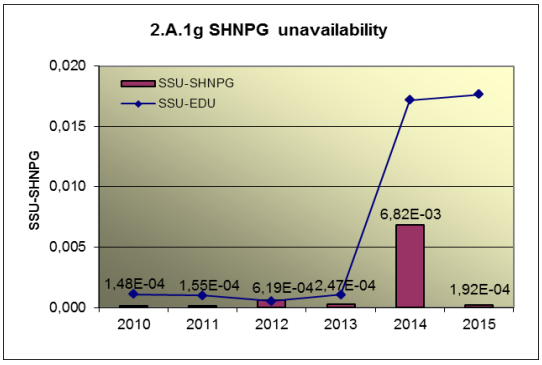


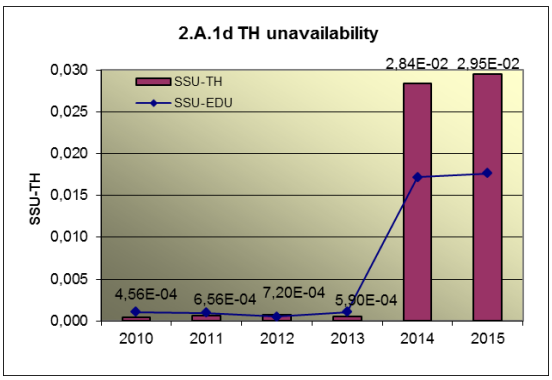






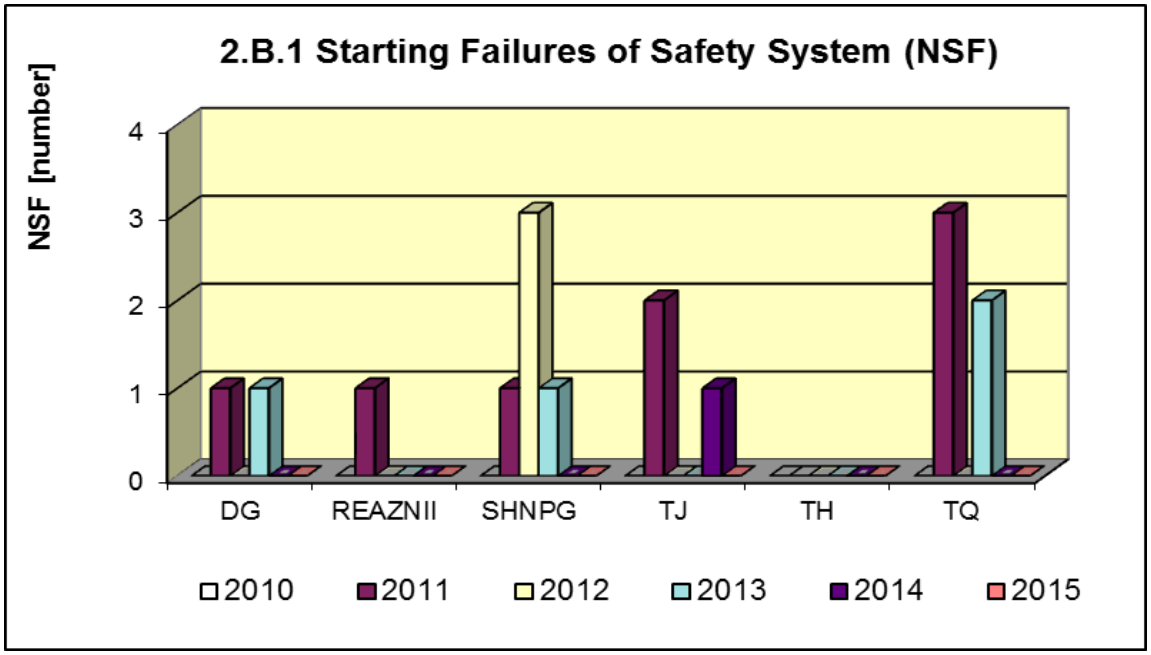




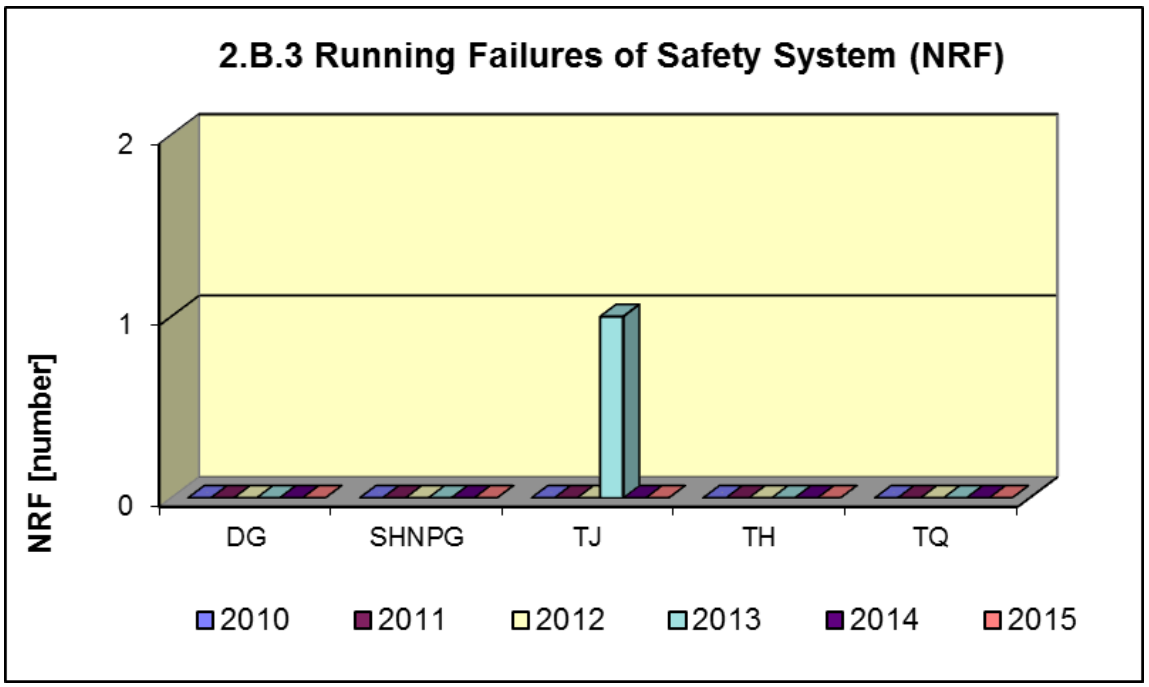


2.B.1 Failure of safety systems

Graph 2.B.1 indicates the number of starting failures of the safety system (NSF), i.e. the state when the respective system, possibly set after the command to start, does not achieve nominal performance characteristic or its failure (shutdown) occurs within 30 minutes after its start.



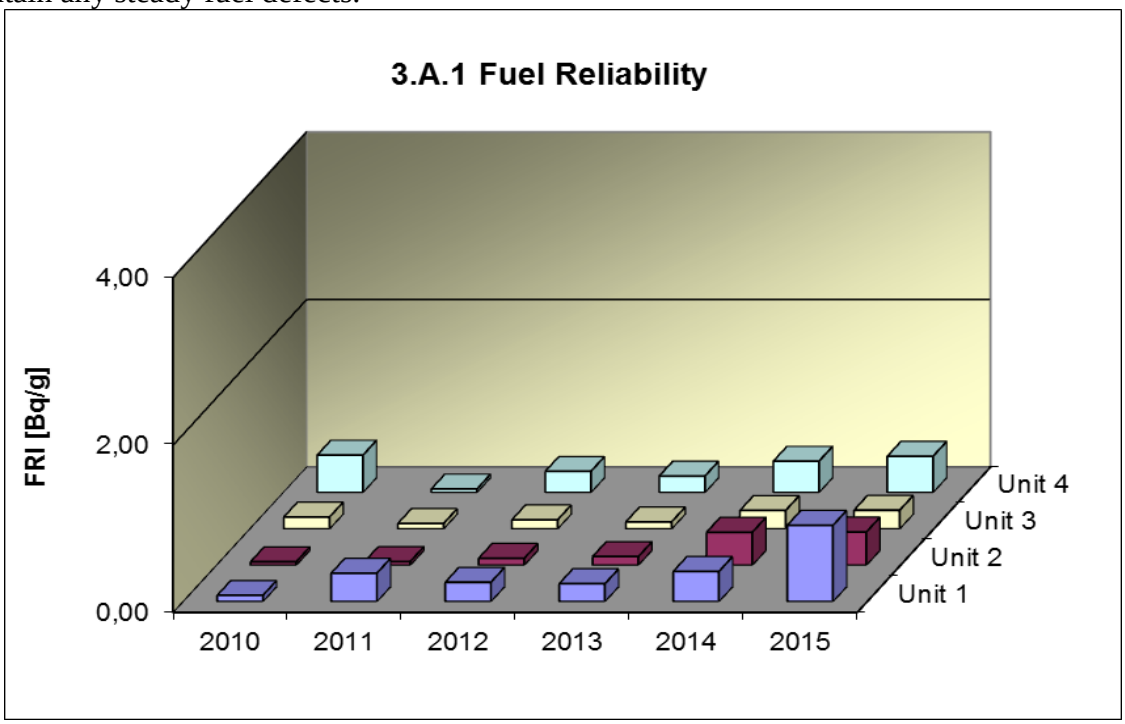
Graph 2.B.3 indicates the number of running failures of safety system (NRF), i.e. the number of states when failure shut down of respective system, drive, possibly set occurs at nominal performance characteristics for the time exceeding 30 minutes since its starting.



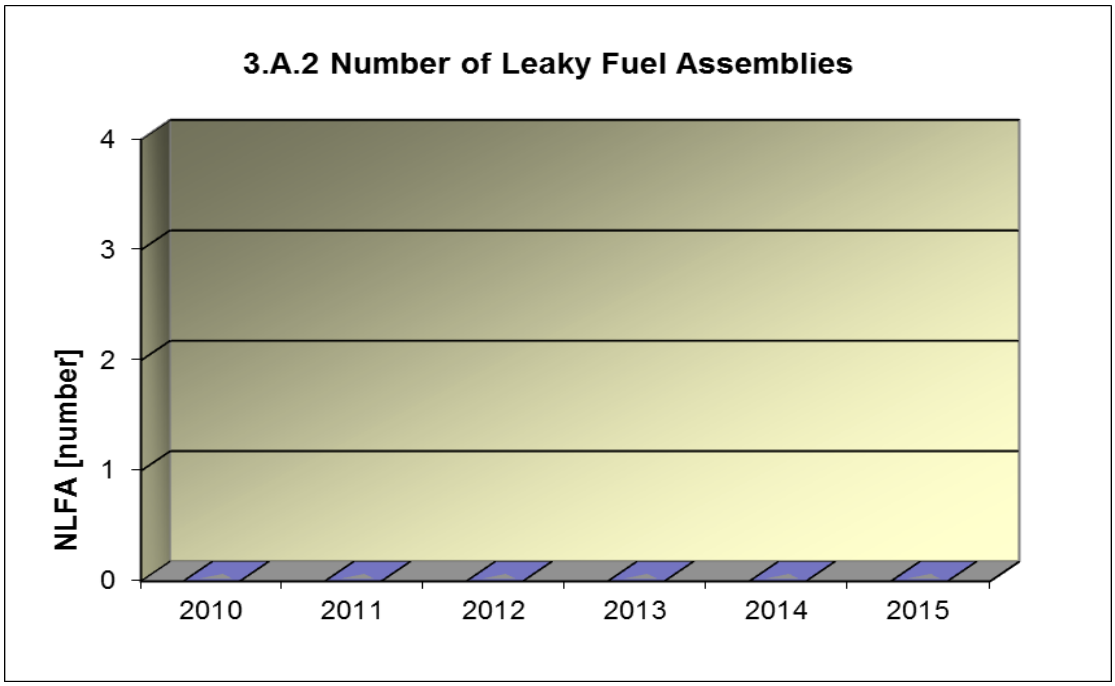
3. Barriers Integrity

3.A Nuclear fuel

Graph 3.A.1 monitors fuel reliability of particular units through the values of FRI - Fuel reliability index. The value FRI ≤ 19Bq/g expresses that reactor core most likely does not contain any steady fuel defects.

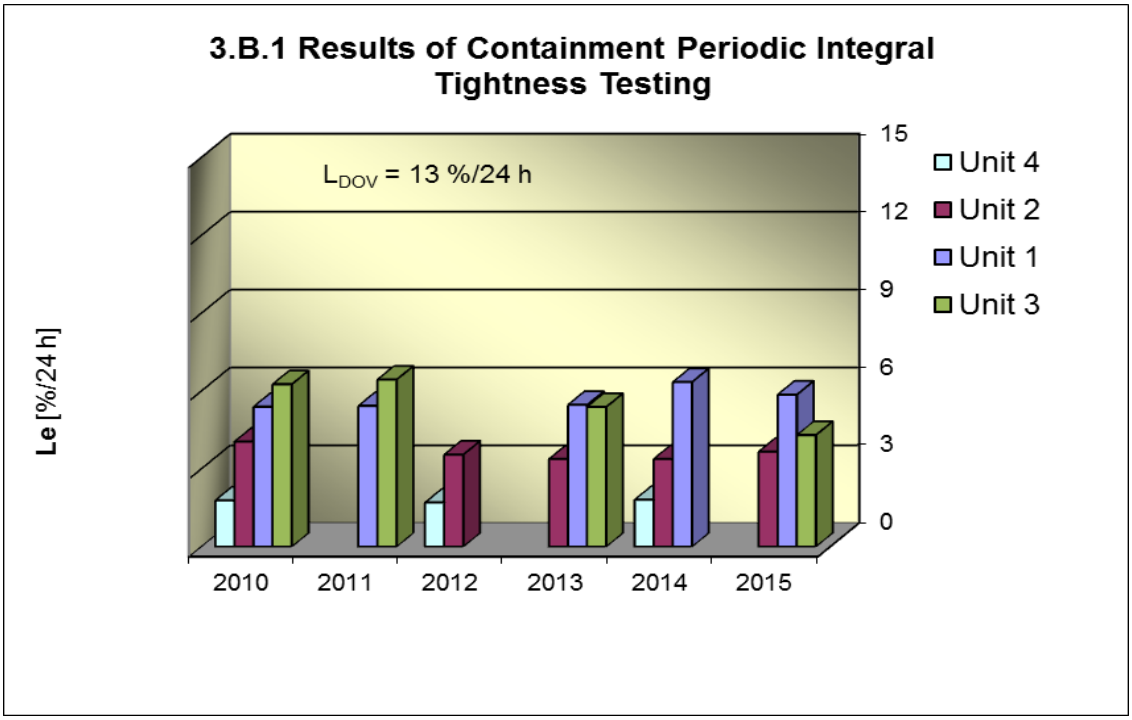


Graph 3.A.2 indicates the number of leaky fuel assemblies (NLFA) that had to be put out of operation due to their inadmissible leakage.



3.B Containment

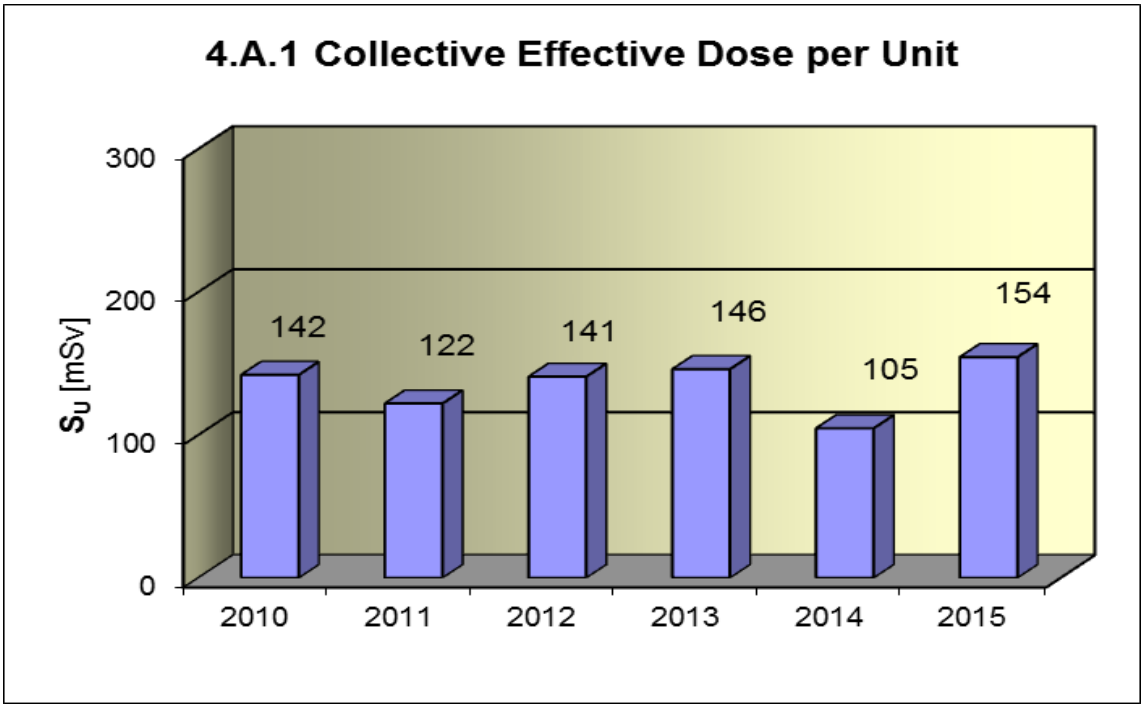
Graph 3.B.1 states the results of Containment periodic integral tightness testing (L_e), i.e. the results of leakage tests of hermetic areas executed by overpressure 150 kPa lasting 24 hours. Extrapolated results are included for the tests with a lower pressure and dwell.
From 2011 – unit testing period = 1x/2 yers



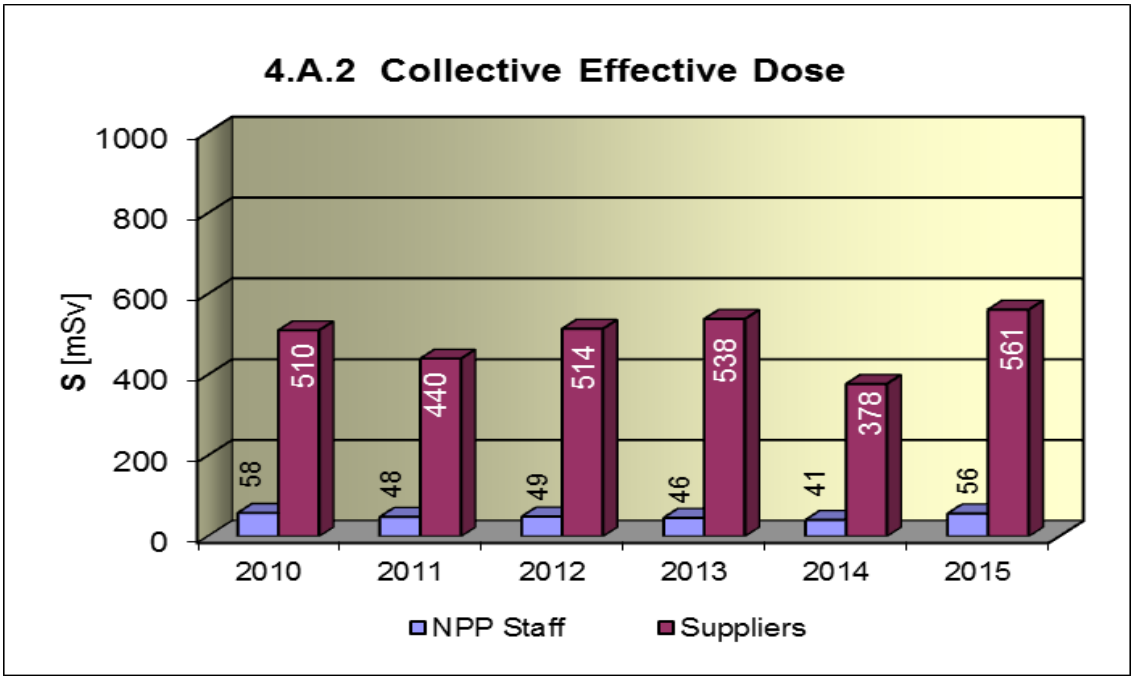
4. Radiation Protection

4.A Staff

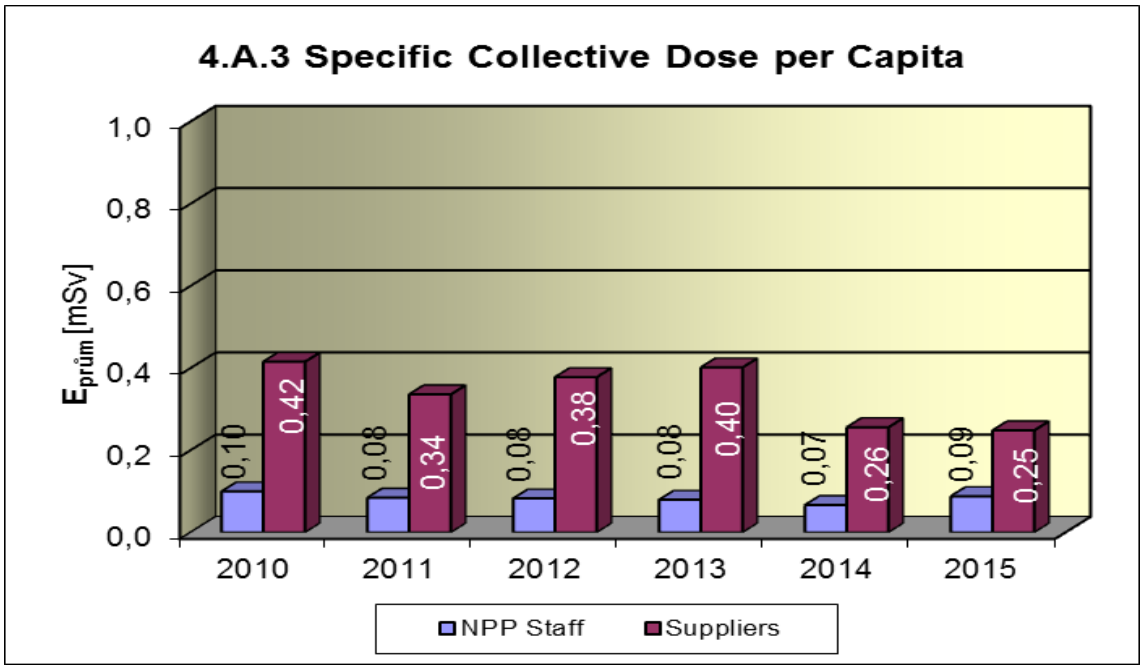
Graph 4.A.1 indicates collective effective dose (CED) received by the staff of NPP (including suppliers and visitors) during monitored period, measured by basic film dosimeters and expressed by mean value per unit.



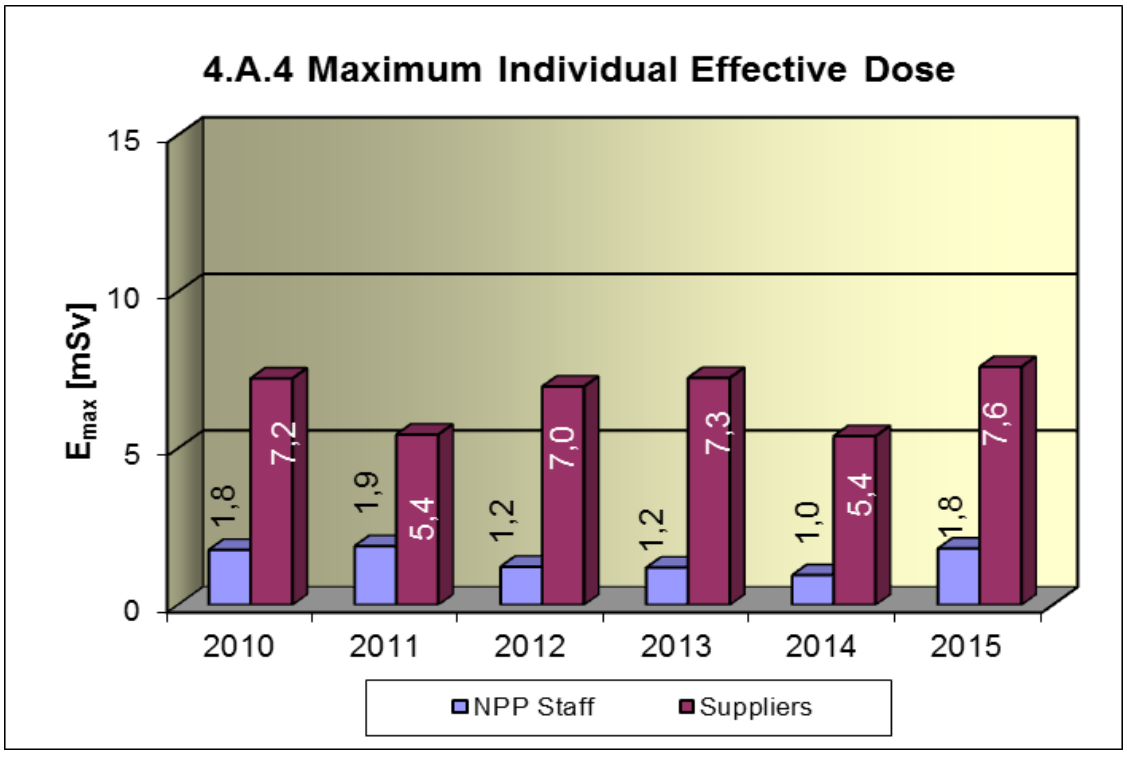
Graph 4.A.2 indicates collective effective dose received by the staff of NPP and suppliers during monitored period, measured by basic film dosimeters.



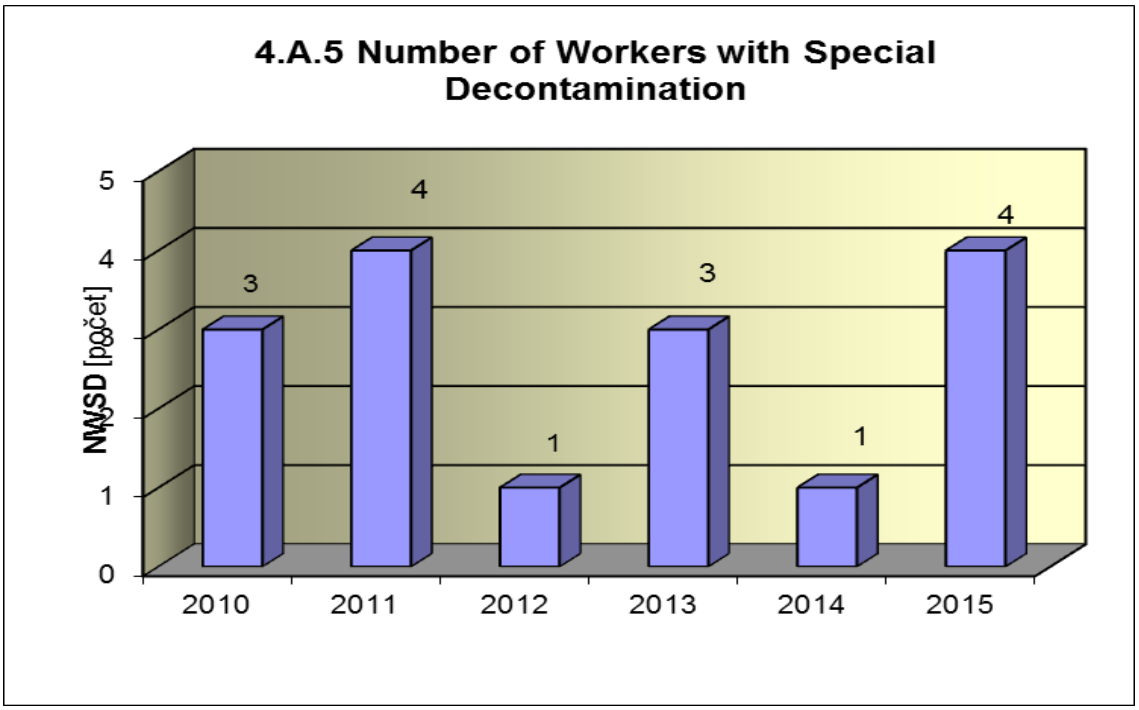
Graph 4.A.3 indicates specific collective effective dose received by the staff of NPP and suppliers during monitored period, measured by basic film dosimeters and express by value per one radiation worker.



Graph 4.A.4 indicates maximum individual effective dose received by one particular employee of NPP and one particular employee of supplier during monitored period, measured by basic film dosimeters.

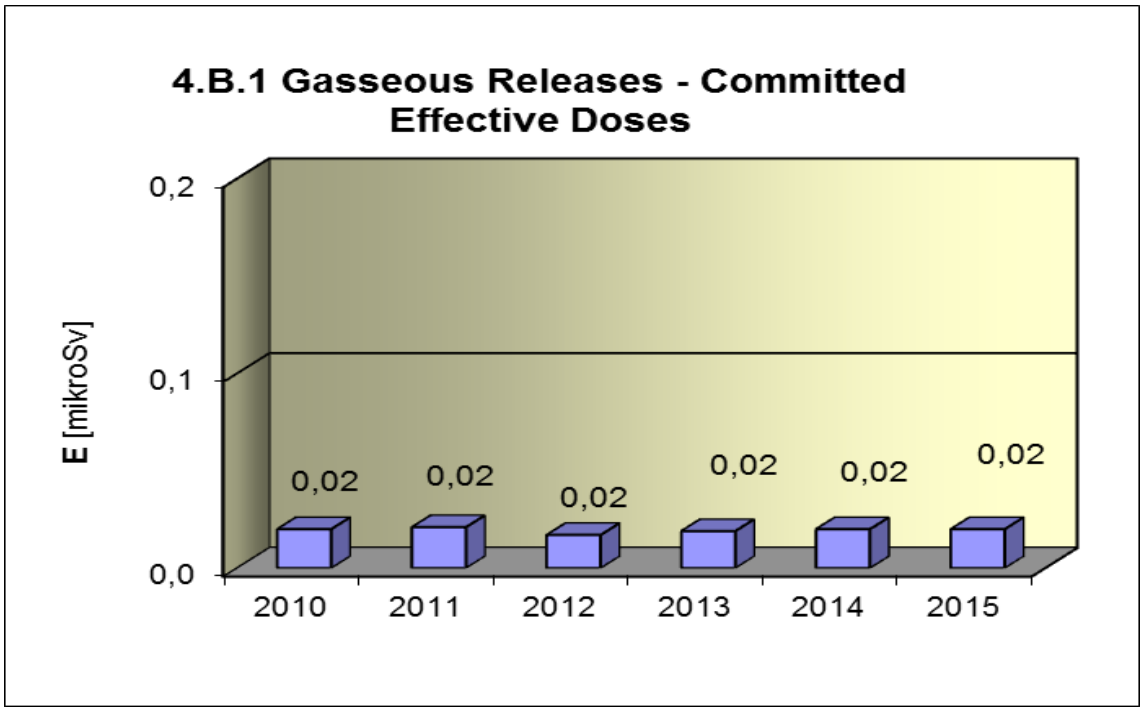


Graph 4.A.5 indicates number of workers (NPP and suppliers) subjected to a special decontamination under medical supervision.

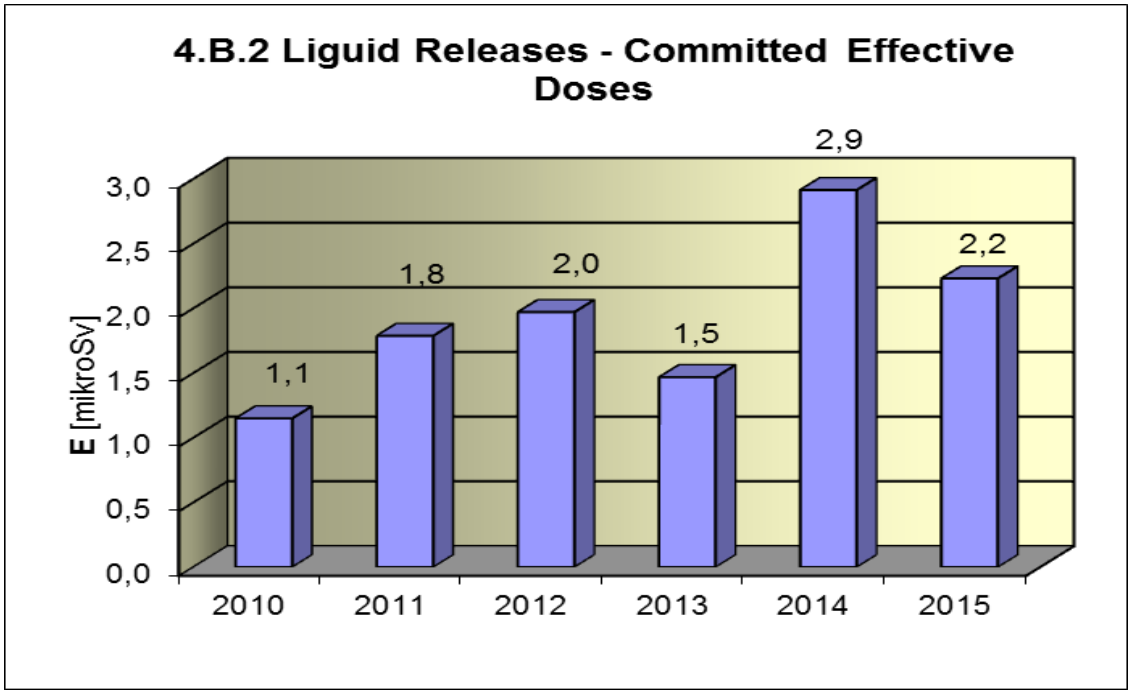


4.B Radioactive Releases

Graph 4.B.1 indicates the committed effective dose for an individual, which arises from radioactive gaseous releases from NPP.



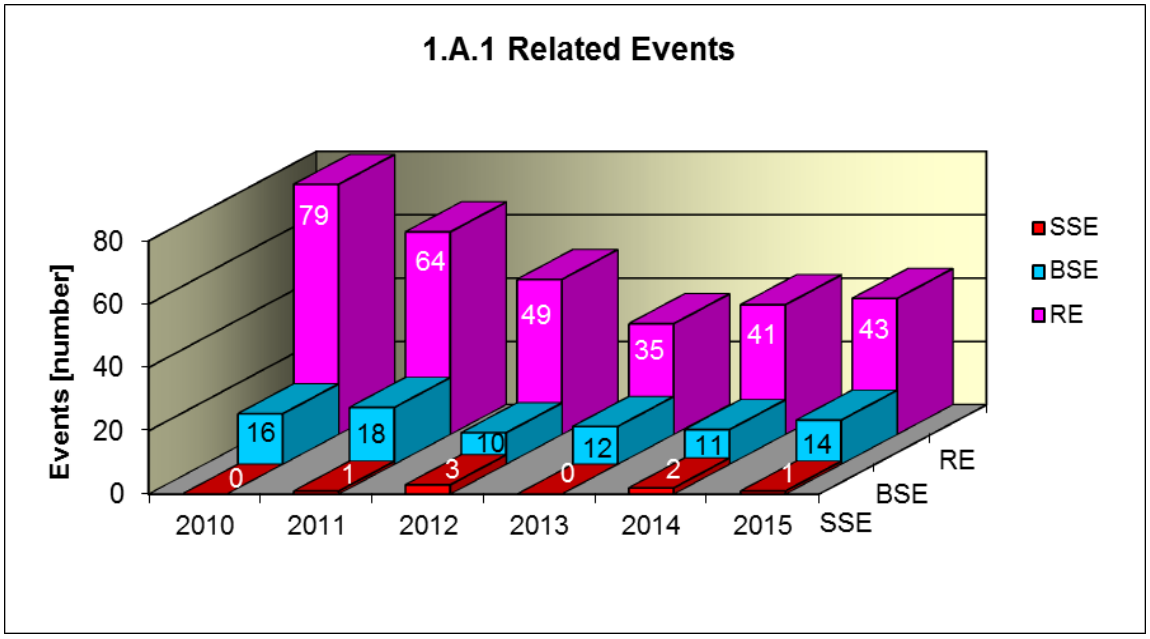
Graph 4.B.2 indicates the committed effective dose for an individual, which arises from radioactive liquid releases from NPP.



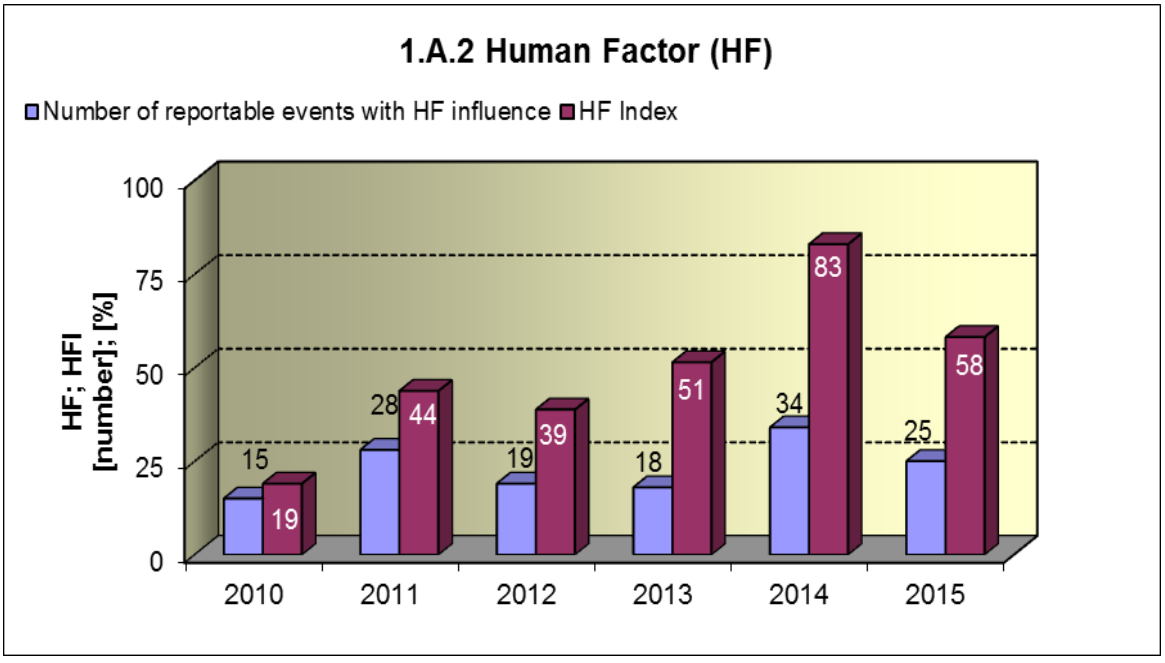
1. Significant Events

1.A Related events

Graph of indicator 1.A.1 monitors the development of the number of related events (RE) including their division according to the evaluation of the International Nuclear Event Scale (INES) into significant events (SSE, INES > 0) and the below scale events (BSE, INES = 0).

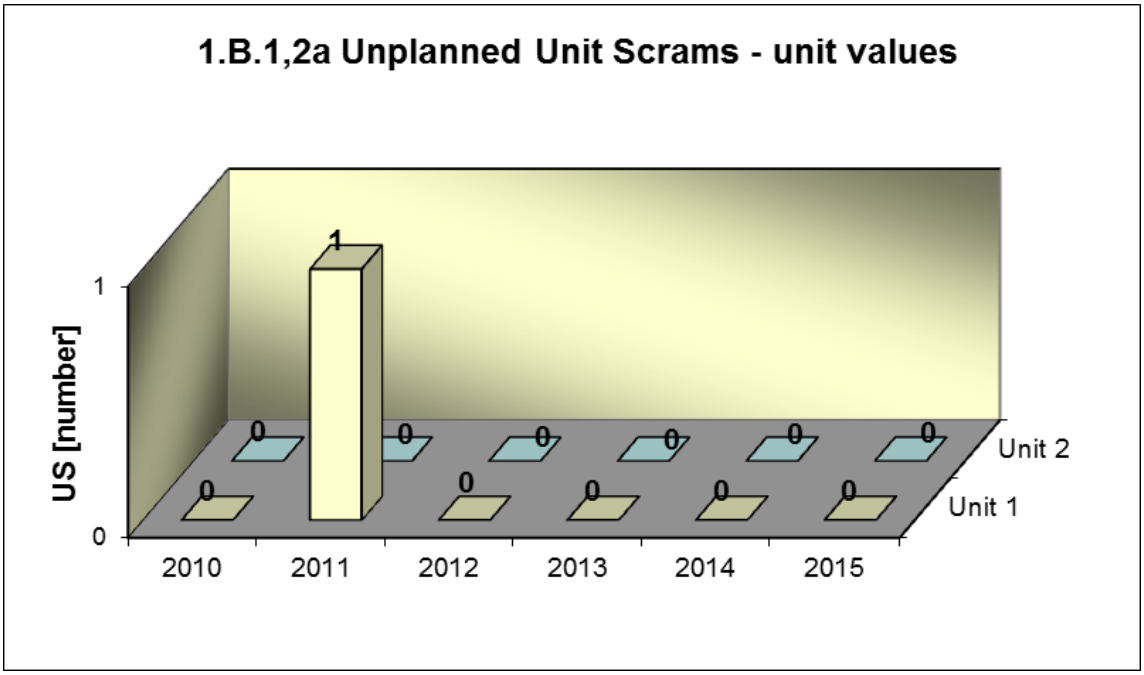


Graph 1.A.2 evaluates the influence of the human factor upon occurrence of safety related events. The indicator is expressed by the number of the safety-related events with an influence of human factor (HF) and its percentage share (HFI).

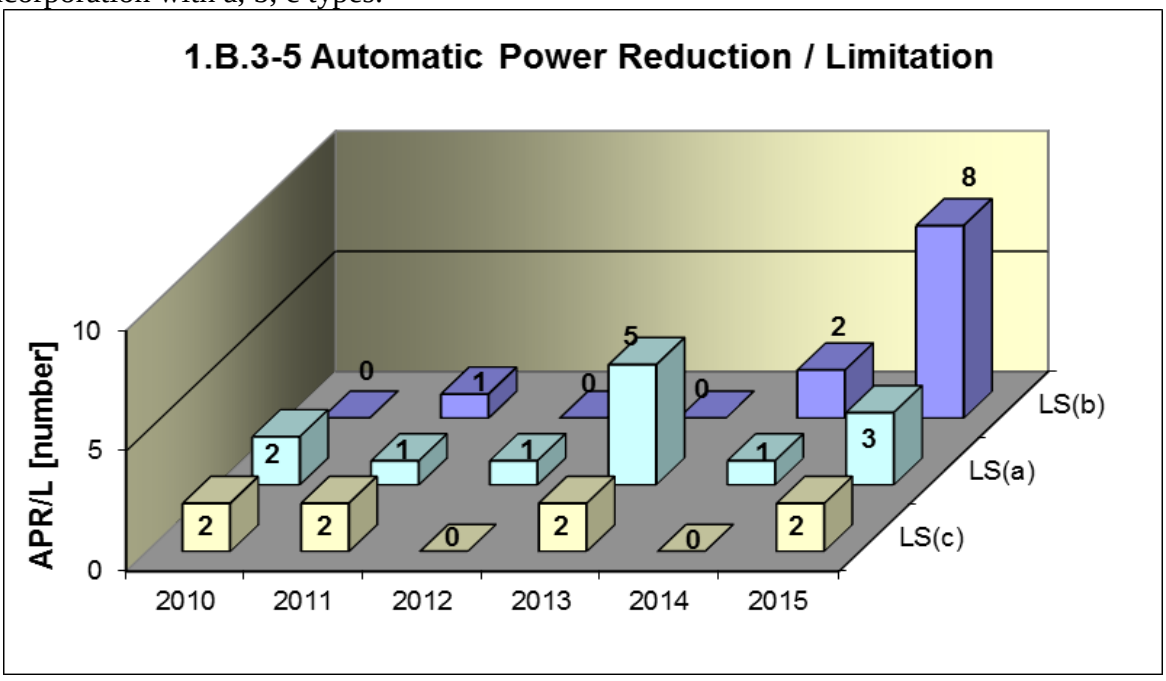


1.B Actuation of the protection and limitation systems

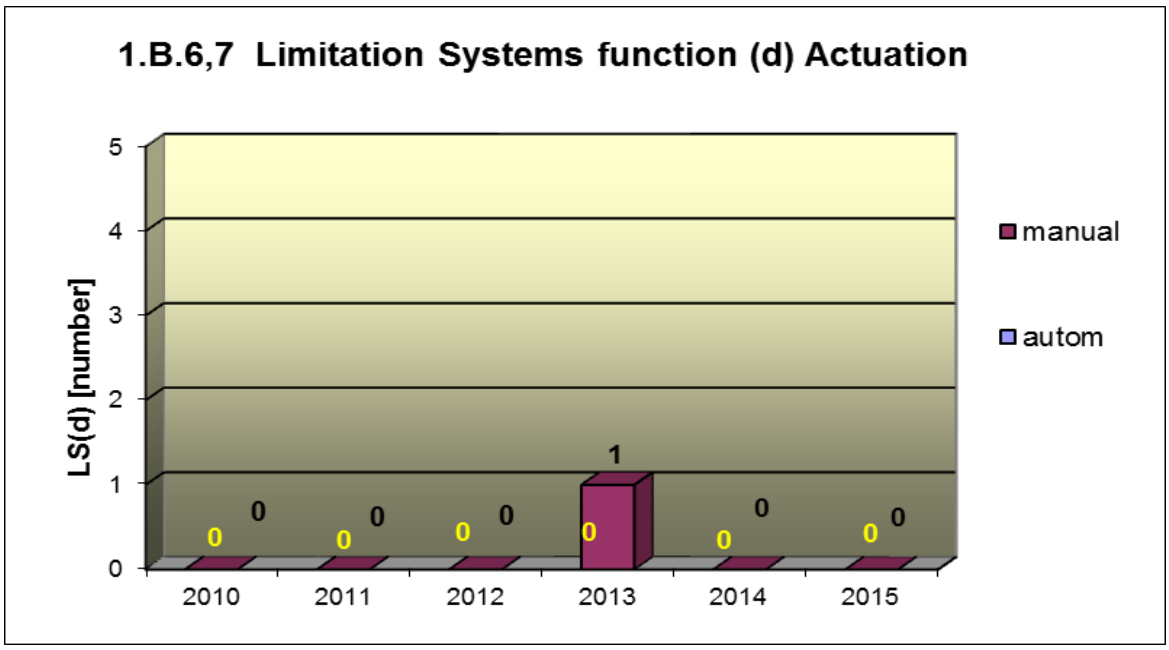
Graph 1.B.1,2 summarises the total number of unplanned unit scrams (US) (reactor in MODE 1 or 2) with resolution of manual and automatic shutdown. The term "unplanned" means that the scram was not an expected part of the planned test.



A common graph of indicators 1.B.3-5 indicates the number of limitation system (LS) incorporation with a, b, c types.

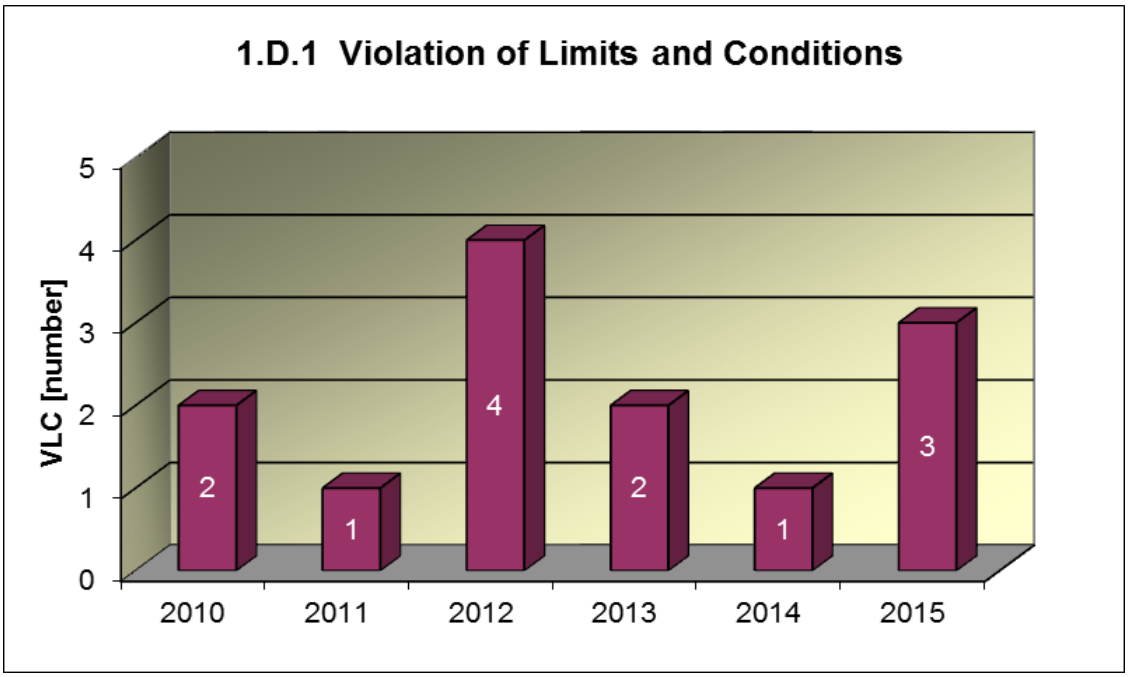


Graph 1.B.6,7 summarises the total number of unplanned reactor scrams with action of the limitation system (LS(d)) (reactor in MODE 1 or 2) with resolution of manual and automatic shutdown. The term "unplanned" means that the scram was not an expected part of the planned test.

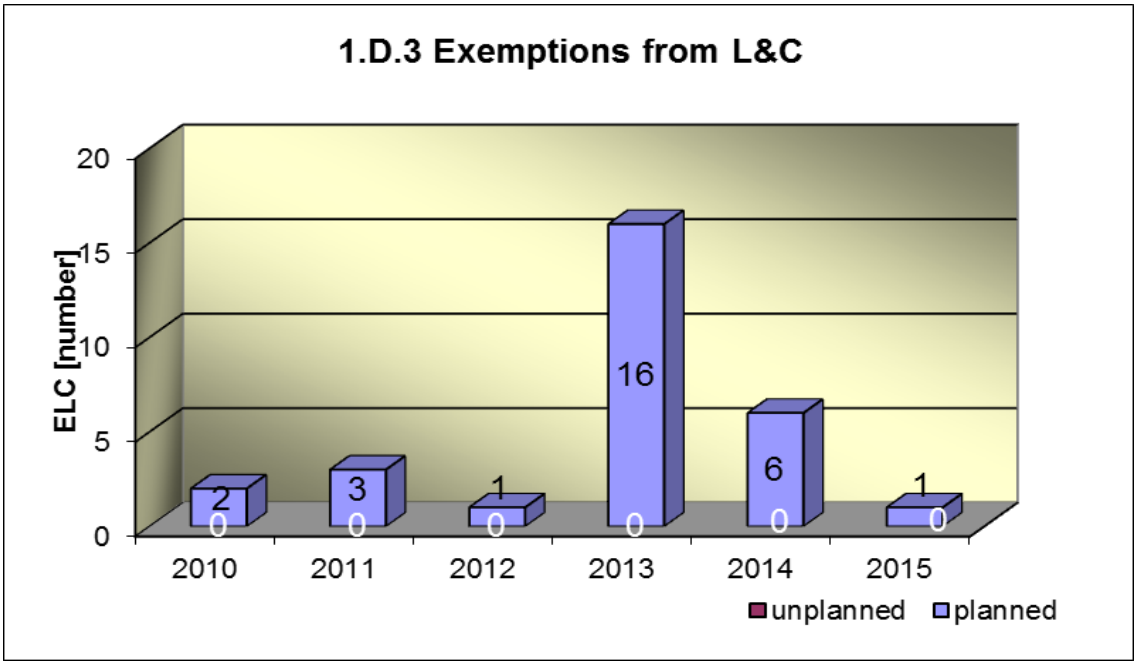


1.D Limits and Conditions

Graph 1.D.1 summarises violations of the Limits and Conditions (VLC) detected by the Regulatory body or reported to the Regulatory body by the licensee.



Graph 1.D.3 summarises the number of planned and unplanned exemptions from the Limits and Conditions (ELC) approved by the Regulatory body including those requiring SUJB approval and however not drawn for various reasons.



2. Safety Systems Performance

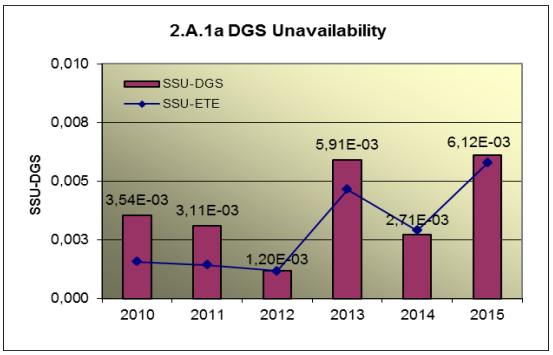
Area 2 monitors and evaluates availability of the following safety systems (BS) in group A:

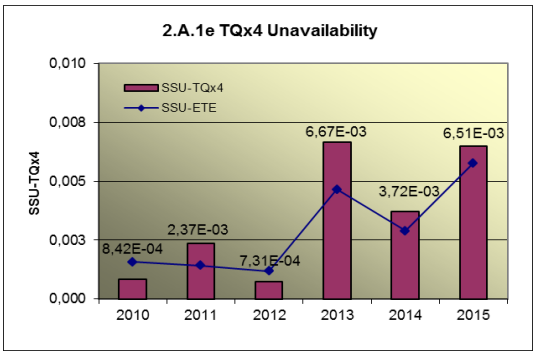
- system diesel generators	**DGS**
- spray system	**TQx1**
- low pressure emergency core cooling system	**TQx2**
- high pressure emergency core cooling system	**TQx3**
- boric acid emergency injection system	**TQx4**
- hydro-accumulators	**HA**
- steam generator emergency feed-water system	**TX**

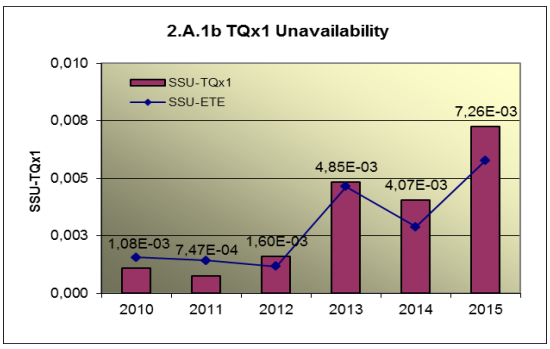
and in group B failure of diesel generator (DG), spray system (TQx1), low pressure emergency core cooling system (TQx2), high pressure emergency core cooling system (TQx3), boric acid emergency injection system (TQx4) in starting and operation.

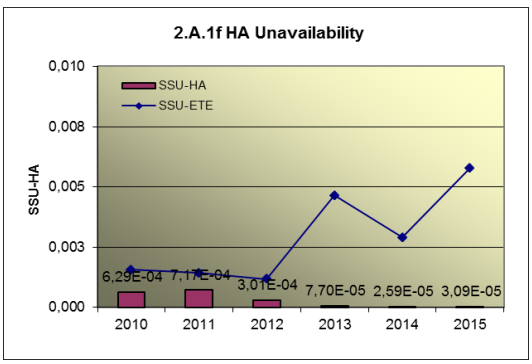
2.A Safety system unavailability

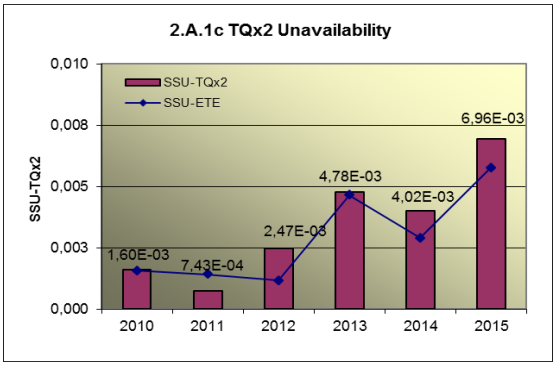
Unavailability of particular safety systems (SSU_S) - graphs 2.A.1.a – g, is defined as the ratio of the total time of unavailability of an evaluated safety system to the total time when its availability was required. In addition, these combined graphs express the ratio of unavailability of respective safety system to the "general" safety system of the site.

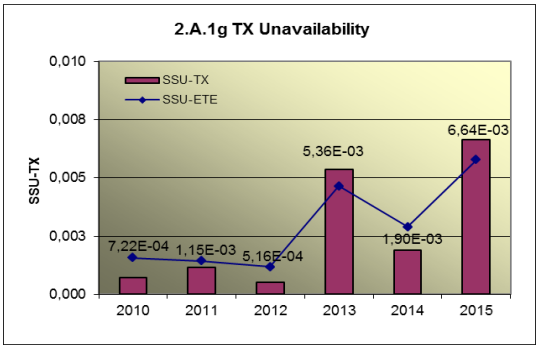


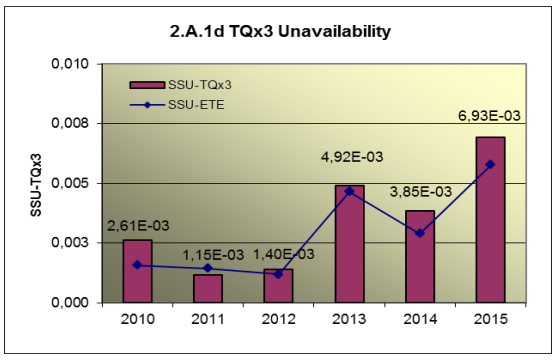






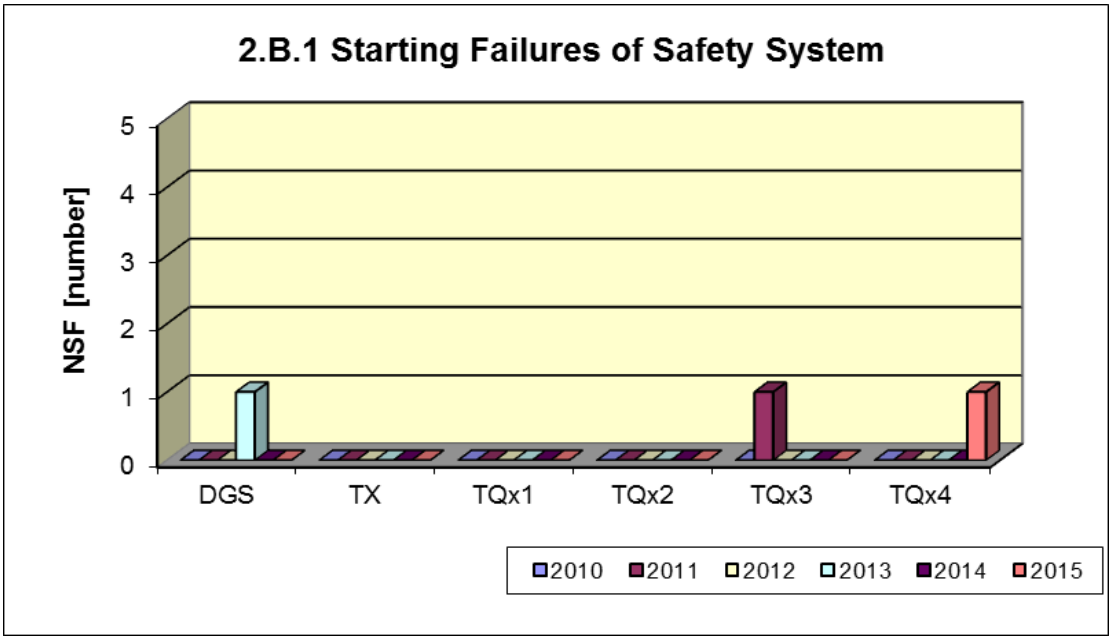




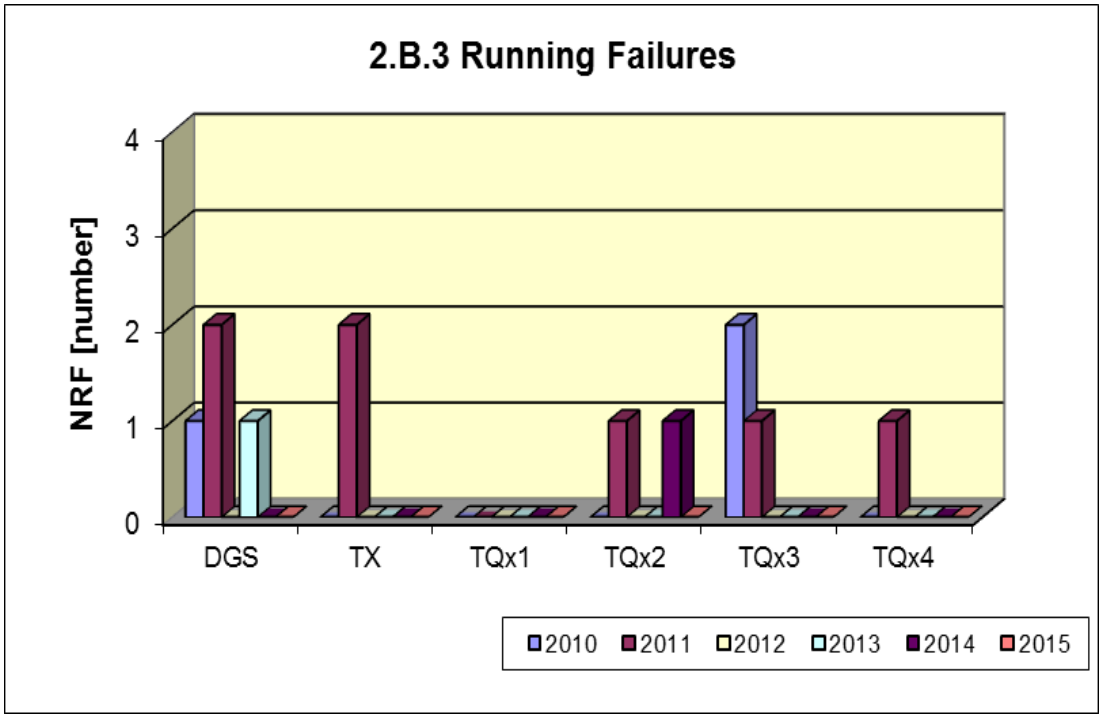


2.B Failure of safety systems

Graph 2.B.1 indicates the number of starting failures of the safety system (NSF), i.e. the state when the respective system, possibly set after the command to start, does not achieve nominal performance characteristic or its failure (shutdown) occurs within 30 minutes after its start.



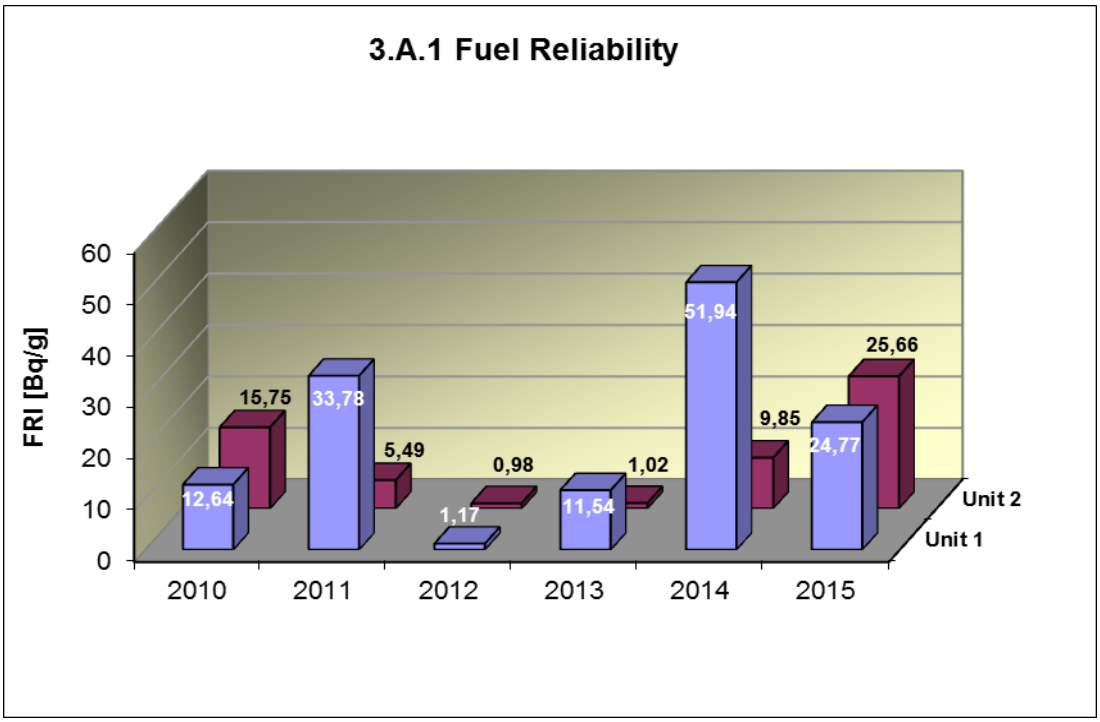
Graph 2.B.3 indicates the number of running failures of safety system (NRF), i.e. the number of states when failure shut down of respective system, drive, possibly set occurs at nominal performance characteristics for the time exceeding 30 minutes since its starting.



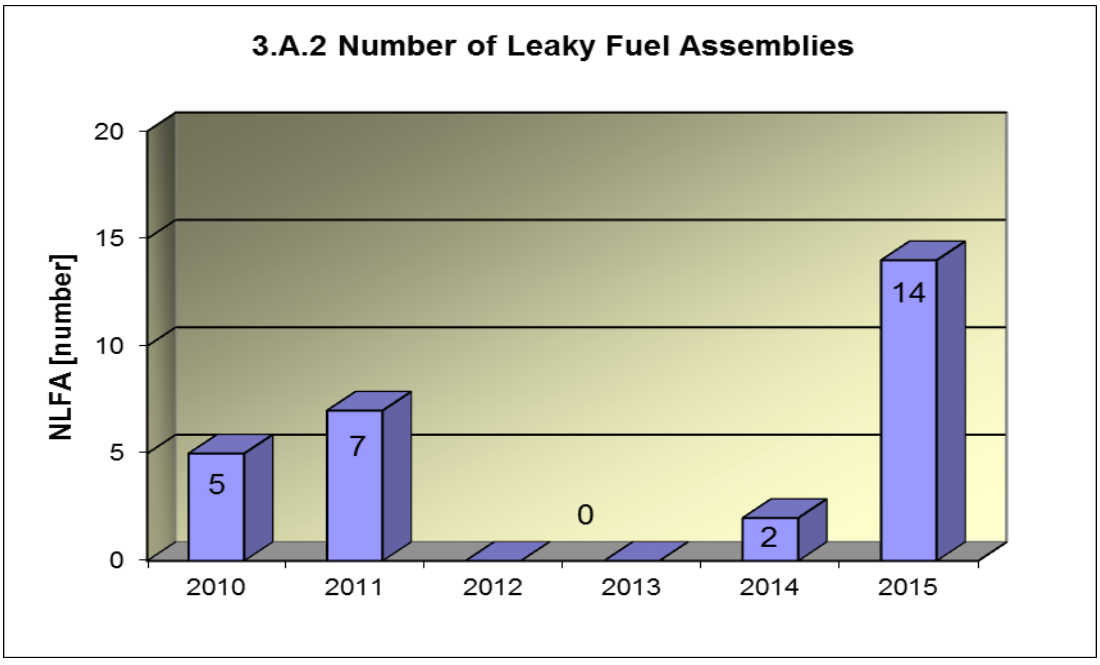
3. Barriers integrity

3.A Nuclear fuel

Graph 3.A.1 monitors fuel reliability of particular units through the values of FRI - Fuel reliability index. The value FRI ≤ 19Bq/g expresses that reactor core most likely does not contain any steady fuel defects.

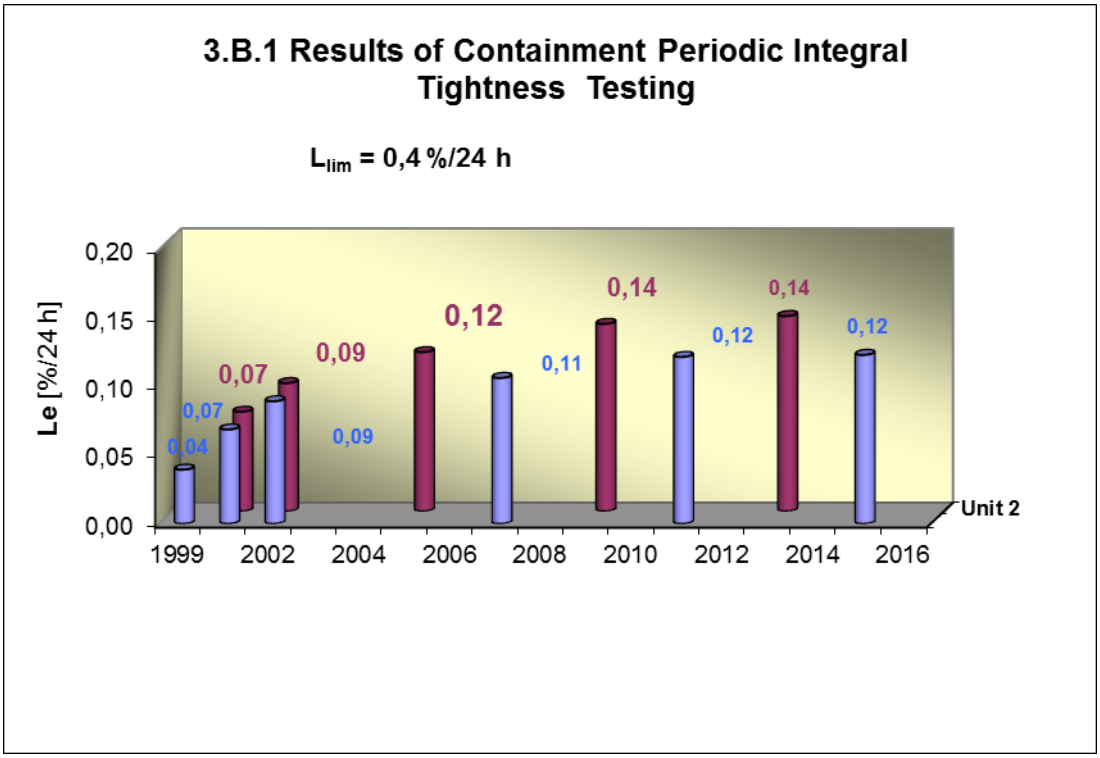


Graph 3.A.2 indicates the number of leaky fuel assemblies (NLFA) that had to be put out of operation due to their inadmissible leakage.



3.B Containment

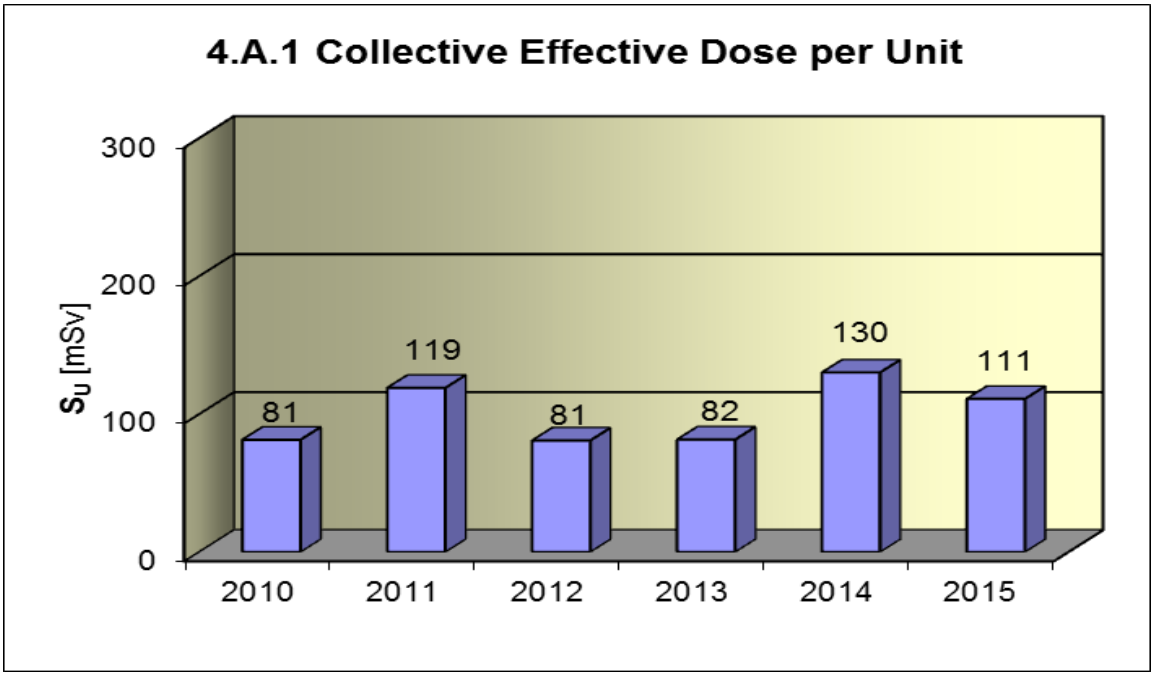
Graph 3.B.1 states the results of Containment periodic integral tightness testing (L_e), i.e. the results of leakage tests of hermetic areas executed by overpressure 400 kPa lasting 24 hours during Containment integrity testing and extrapolated results are stated for Containment integrity repeated testing and Containment integrity periodic testing with lower pressure of 70 kPa and dwell.



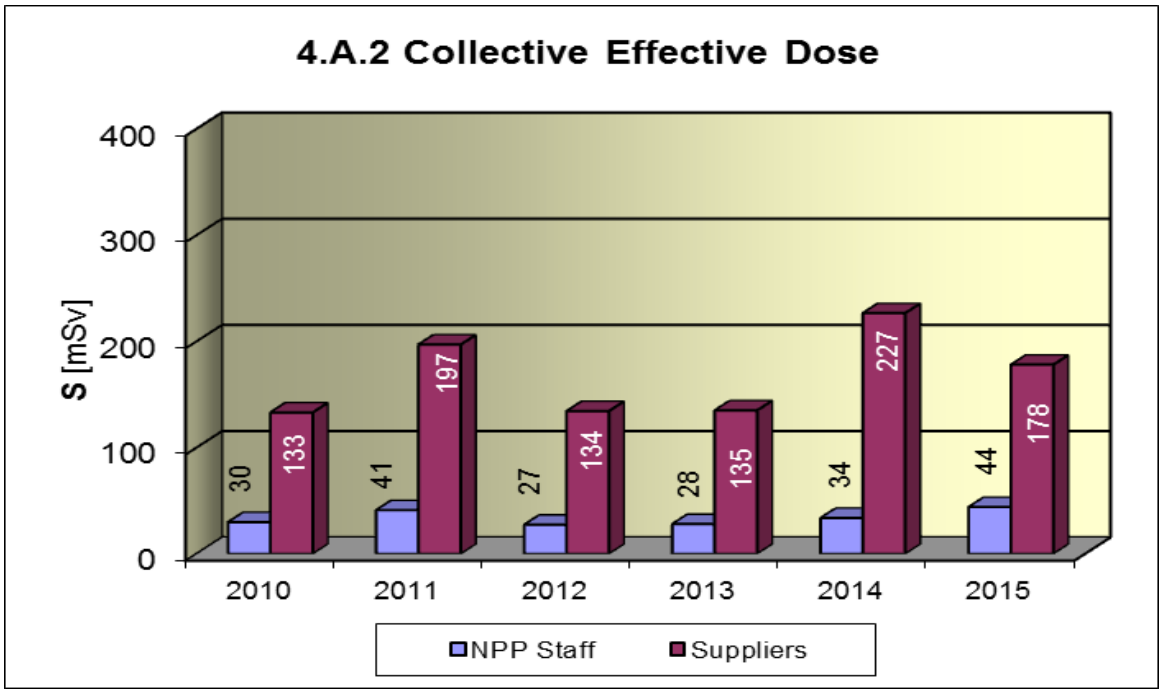
4. Radiation Protection

4.A Staff

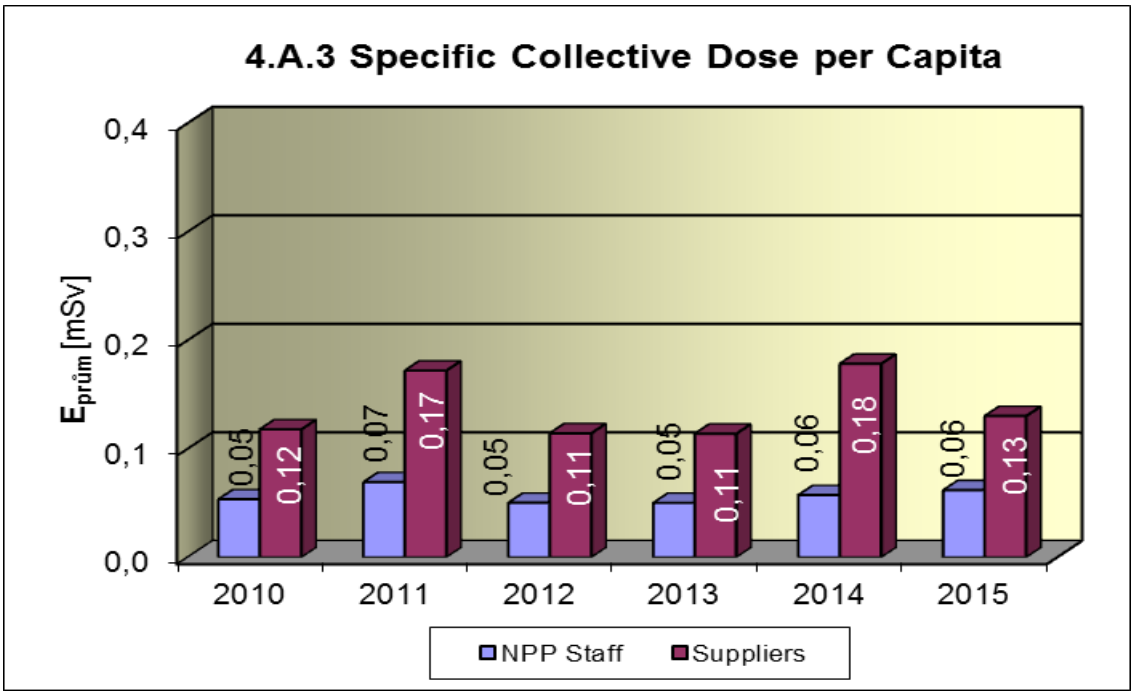
Graph 4.A.1 indicates collective effective dose (CED) received by the staff of NPP (including suppliers and visitors) during monitored period, measured by basic film dosimeters and expressed by mean value per unit.



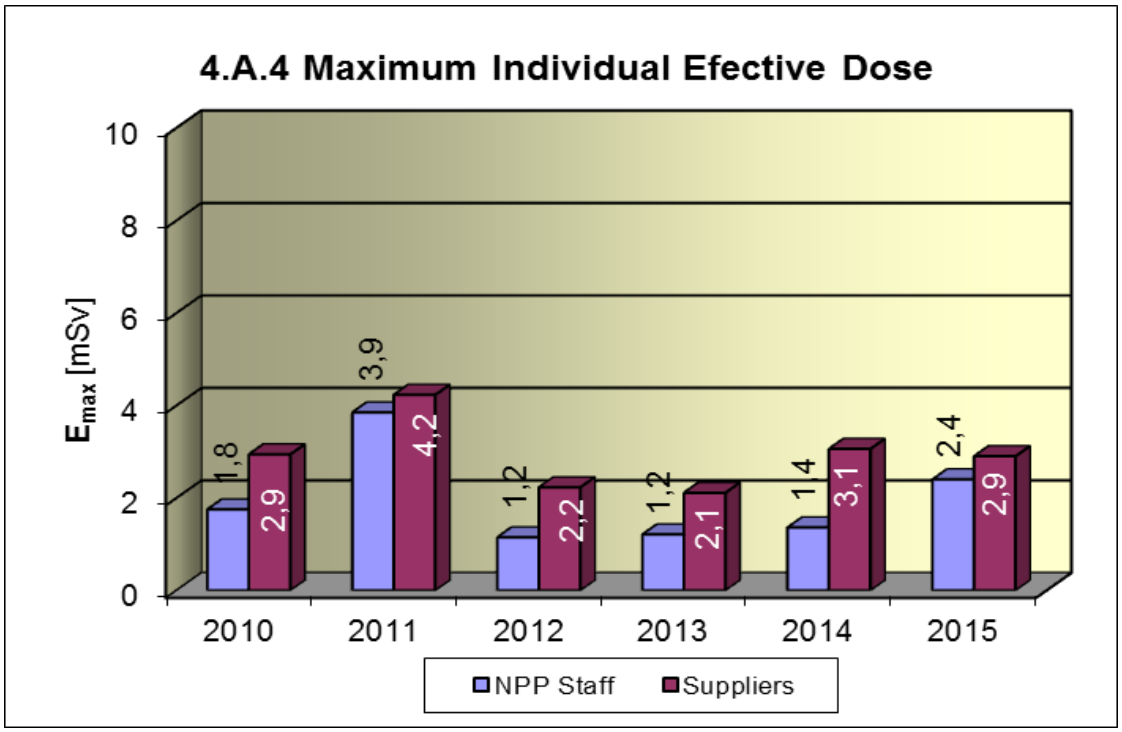
Graph 4.A.2 indicates collective effective dose received by the staff of NPP and suppliers during monitored period, measured by basic film dosimeters.



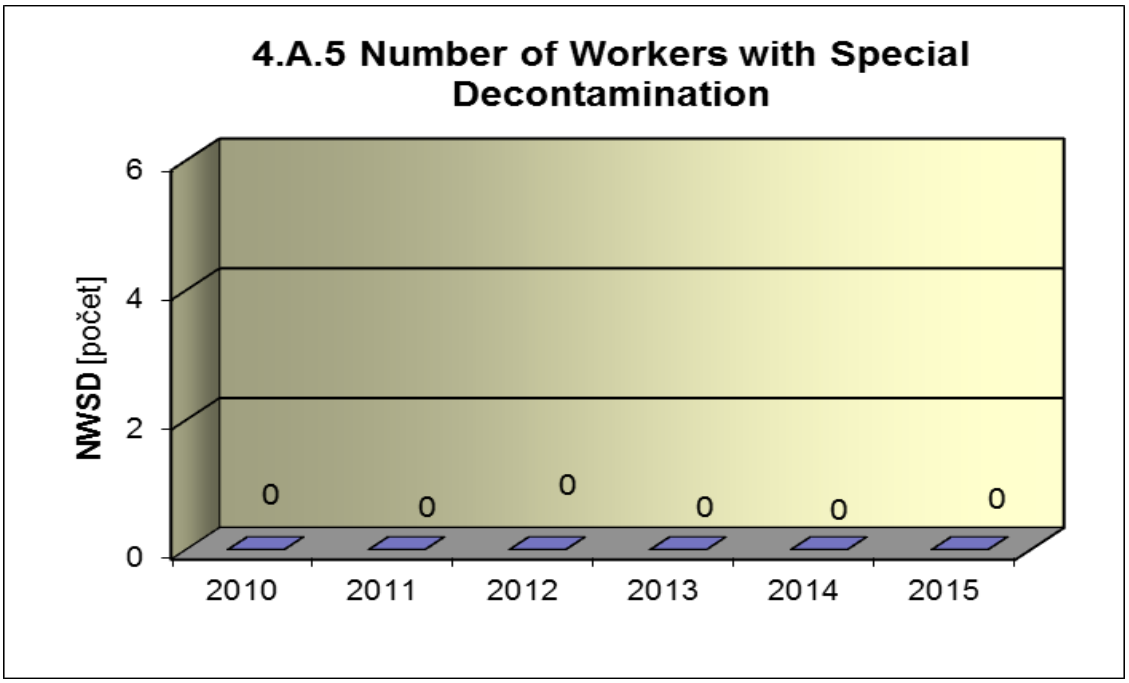
Graph 4.A.3 indicates specific collective effective dose received by the staff of NPP and suppliers during monitored period, measured by basic film dosimeters and express by value per one radiation worker.



Graph 4.A.4 indicates maximum individual effective dose received by one particular employee of NPP and one particular employee of supplier during monitored period, measured by basic film dosimeters.

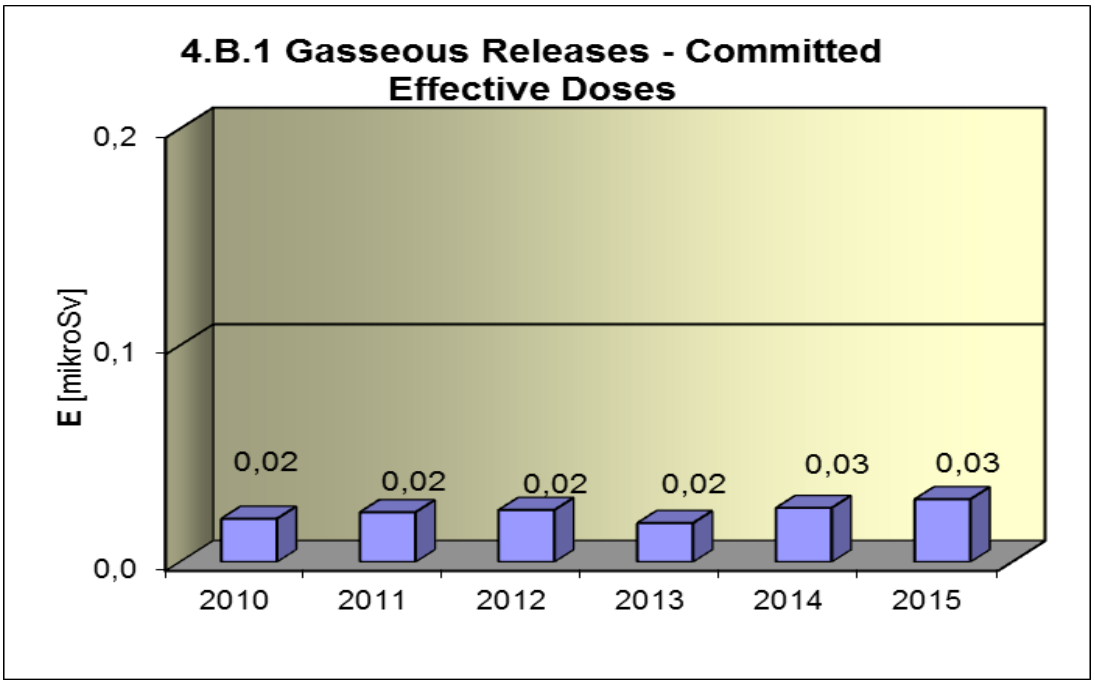


Graph 4.A.5 indicates number of workers (NPP and suppliers) subjected to a special decontamination under medical supervision.



4.B Radioactive Releases

Graph 4.B.1 indicates the committed effective dose for an individual, which arises from radioactive gaseous releases from NPP.



Graph 4.B.2 indicates the committed effective dose for an individual, which arises from radioactive liquid releases from NPP.