RULEBOOK

ON RADIOACTIVITY MONITORING

("Official Gazette of RS", no. 97/2011)

Article 1

This rulebook stipulates the methods and requirements for the systematic environmental radioactivity examination and systematic environmental radioactivity examination in surroundings of the nuclear facility.

Article 2

The expressions below shall have the following meaning herein:

1. Radioactive effluents shall mean gases, fumes, aerosols, liquids etc. discharged from the nuclear facility while in a normal operating regime or in case of an emergency and which contain radionuclides that originated in it;

2. Emission shall mean the discharge of radioactive effluents from the nuclear facility within a certain period of time. Data about the emission, determined at the place of discharge, consist of data about activities of all significant radionuclides contained in effluents in that period;

3. Radionuclides contents in the environment shall mean single specific activities (Bq kg^{-1}, Bq m^{-3}, Bq l^{-1}, Bq m^{-2}) of all significant radionuclides in certain environments, at certain locations in the environment caused by the emission;

4. A critical group of population shall mean a representative group of population at a certain location in the surroundings of the nuclear facility for which it is estimated that they can be exposed to ionizing radiation due to the operation of the nuclear facility; it shall be defined by applying a mathematical model;

5. Authorized radiation dose limit shall mean the limit value of the effective dose for an individual or for a critical group of population, which is accepted by the competent authorities as optimal for a single nuclear facility and which is, as a rule, lower than the limit of the effective dose stipulated for individuals from the population;

6. Surroundings of the nuclear facility shall mean the area that starts from the physical limit of the nuclear facility and covers the distance determined in the report on nuclear safety for every single nuclear facility;

7. Measurement method is the general description of a logical sequence of operations used for measurements;

8. Specific methods for determining the contents of radionuclides comprise measurement of activities with properly gauged alpha, beta and gamma counters and measurement of activities in samples previously prepared by means of a radiochemical or other standard method.

9. Non-specific measurement methods shall mean methods based on which the total alpha, beta or gamma activity of the examined sample is determined;

10. Sample, aggregate sample shall mean the representative part of the air, water, soil or other material which is taken at the measuring site for analysis in specific time intervals and in the manner provided for herein. Samples can be one-time samples and *aggregate* samples. A one-time sample is a sample taken once from the analysed material. An *aggregate* sample is a sample taken within a known time interval or the set of single samples taken within a known time interval;

11. Sampling is the process of taking samples;

12. Bio-indicators are plant or animal organisms which, in the observed environment, concentrate specific chemical elements or compounds and react to changes of their concentrations in the environment.

Other expressions used herein shall have the meanings defined in Article 3 of the Law on Radiation Protection and Nuclear Safety.

Article 3

The systematic examination of radioactivity in the environment (hereinafter: radioactivity monitoring) is carried out by taking into account all possible pathways in which population could be exposed to ionizing radiation originating due to external radiation, inhalation and ingestion.

The radioactivity monitoring encompasses measurements of radionuclide concentration which contributes considerably to the dose, in order to assess the level and to control the exposure of the population to ionizing radiation.

Measurements within the radioactivity monitoring are performed in a way that enables the monitoring of changes in radioactive contamination of the environment and changes in external radiation with time.

Within the radioactivity monitoring, data are collected that are needed for the interpretation of results of radioactivity measurements and for the dose assessment, such as data about the quantity of precipitations and other meteorological data about the flow rate of the running water, quantity of distributed drinking water and other.

The results of the radioactivity monitoring must be evaluated and prepared in a way to be useable for the assessment of the public exposure, for the monitoring of changes in the public exposure from the environment and for decision-making in relation to the need to take protection measures in case of an enhanced radioactivity in the environment.

Article 4

The contents of radionuclides in environmental samples are determined by gamma spectrometry method and specific methods.

However, for measurements during interventions in case of an emergency, or when the radioisotopic composition is known and does not change over time, it is allowed to use non-specific methods and the method of low-resolution gamma spectrometry.

Certain types of measurements, such as the measurement of the level of external radiation, are done with automatic measurement systems.

Article 5

The collection and preparation of samples must be done by reducing the loss of radionuclides during the collection and preparation of samples to the minimum.

The preparation and measurement of single samples is done within the shortest possible period of time after the sampling, in order to determine the presence of short-lived radionuclides and enable the timely implementation of corresponding measures in case of enhanced radioactivity.

When preparing aggregate samples, the preparation of parts of the aggregate sample is done as soon as possible after the sampling and the measurement of the aggregate sample immediately after the preparation of the last part of the sample.

In case of monitoring in emergency situations, the sampling period is shorter than the sampling period in regular situations and is adjusted to level of the accident.

The equipment for measurements must be calibrated. Measurements are performed in such a way to enable the tracking back of the results to an internationally recognized gauge. The results must be stated with measuring uncertainty.

Article 6

The examination of the level of external radiation is done with devices for the continuous measurement of the ambient dose rate equivalent and with thermoluminescent dosimeters, which are positioned at a height of 1 m above the uncultivated grassy area. The measurement results for the ambient dose rate equivalent in the environment are automatically sent to the system for early warning of emergency.

By way of exception, if the device for the continuous measurements of the ambient dose rate equivalent does not send automatically timely emergency warnings to the system, the legal entity authorized to perform the measurements for early warning of emergency shall send the data about external radiation to the Serbian Radiation Protection and Nuclear Safety Agency (hereinafter: Agency) at the latest by the 5^{th} in the current month for the previous month, but without delay in case of an emergency or at the request of the Agency.

The Agency supervises the system for early warning of emergency. The Agency collects and processes data from the system for early warning of emergency.

Article 7

The contents of radionuclides is determined in samples of air, precipitations, surface water, soil, crop cultures, foodstuff, drinking water, feedingstuffs.

Aerosol samples are taken by means of continuous air pumping through filters of known efficiency. The contents of the radionuclides in the aerosol are determined by measuring of aggregate samples by the gamma spectrometry method. The detection limit for the gamma spectrometry determination of contents of the radionuclide ^{137}Cs in aerosol must not exceed 10 $\mu Bq/m^3$. The contents of radionuclides in the aerosol sample are stated in Bq/m^3 of air.

Samples of solid and liquid precipitations are collected continuously at a height of 1 m above an uncultivated grassy area with a sampler the surface of which is at least 0.6 m^2. The contents of radionuclides in the precipitations are determined in aggregate samples. The contents of radionuclides in precipitations are stated in Bq/m^2.

The activity of radon, ^{222}Rn, in the air is determined by means of the alpha trace detection method, alpha spectrometry, absorption on active carbon and by means of other standard methods. The activity of radon is stated in Bq/m^3 of air.

The activity of short-lived radon daughter is determined by the alpha spectrometry method or by means of another standard method.

Soil is sampled from at least three different depths in order to obtain data about the distribution of radionuclides through soil profile. During the preparation of soil samples it is necessary to remove roots and stones. The contents of gamma-emitting radionuclides are determined by means of the gamma spectrometry method. The contents of strontium, ^{90}Sr, are determined by measuring the beta radiation after the radiochemical separation of strontium.

The contents of radionuclides in samples of surface water are measured in aggregate samples. The contents of gamma-emitting radionuclides are measured with the gamma spectrometry method. The contents of tritium ^3H in samples of surface water are determined by measuring the activity with a liquid scintillation or proportional counter.

The contents of radionuclides in drinking water are measured with devices the detection limits of which for gamma-emitting radionuclides are thirty times lower than the stipulated limits for radionuclide contents in drinking water. The total alpha activity, the total beta activity and the activity of the tritium are determined in drinking water by measuring the activity with a liquid scintillation or proportional counter. The activity of ^{90}Sr in drinking water samples is determined by measuring the activity of beta radiation after the radiochemical separation.

Article 8

During the examination of the transmission pathways of radionuclides through the food chain the samples must be chosen in a way that will make it possible to assess the annual intake of radionuclides by an individual from the critical group of population, whereby:

1. The eating habits of the population must be taken into account and the analyzed samples must be as close as possible to the end of the food chain. In the case of an emergency, the monitoring is expanded to the start of the food chain;

2. Foodstuff that is controlled should be typical for the area in which the annual intake in the organism is assessed, i.e. they should be produced in the agricultural industry in that area;

3. Non-typical foodstuff is taken for sampling if it determines the transmission paths for which the highest impact of emission is expected (critical group and critical path);

4. During the selection of foodstuff of plant origin advantage shall be given to foodstuff whose leaves with a large surface are consumed and whose ripening lasts longer;

5. For the control one should always choose the same foodstuff in order to be able to compare the results on a multi-annual level.

Milk samples are collected in dairy factories or directly from the producer. Samples of other foodstuff are taken on green markets, in large food product stores or directly from the producer. The contents of radionuclides in foodstuff is measured with devices whose detection limits for gamma-emitting radionuclides are three times lower than the limits of radionuclide contents in drinking water as stipulated in the Rulebook on the Limits of Radionuclide Contents in Drinking Water, Foodstuff, Feedingstuffs, Medicines, Consumer Goods, Construction Material and other Goods placed on the Market, whereby the volume of 1 m^3 water is replaced by a 1000 kg weight. The contents of ^{90}Sr are determined by measuring the activity of beta radiation after the radiochemical separation of strontium.

Composite food samples consist of soup, main meal, salad, dessert and are taken in larger catering facilities, social restaurants and kindergartens. The contents of radionuclides in foodstuff are measured with devices whose contamination limits for gamma-emitting radionuclides are three times lower than the limits of radionuclide contents in drinking water as stipulated in the Rulebook on the Limits of Radionuclide Contents in Drinking Water, Foodstuff, Feedingstuffs, Medicines, Consumer Goods, Construction Material and other Goods placed on the market, whereby the volume of 1 m^3 water is replaced by a 1000 kg weight. The contents of ^{90}Sr are determined by measuring the activity of beta radiation after the radiochemical separation of strontium.

Feedingstuffs samples encompass fresh bulk feedingstuffs, dry bulk feedingstuffs and feed mixtures for the feeding of different kinds and categories of animals. The contents of radionuclides in feedingstuff samples are determined by the gamma spectrometry method and the specific method for the determination of the ^{90}Sr contents.

The contents of radionuclide in bio-indicators are measured if the contents of radionuclides in the environment are too low to be measured in ordinary samples. The mass of the prepared bio-indicator sample must be at least 20 g, whereby the conditions for the measuring of the radionuclides content must be such to satisfy the conditions of detection limits for foodstuff.

Article 9

Through the radioactivity monitoring the environmental radioactivity is monitored which is a consequence of global and local pollution originated by using sources of ionizing radiation, further of the presence of naturally occurring radioactivity and of enhanced naturally occurring radioactivity that originate in technical and technological processes.

In case of unexpected increase of radioactivity, the radioactivity monitoring ensures data for the timely implementation of radiation protection measures.

Article 10

The environmental radioactivity monitoring encompasses measuring the level of external radiation over the soil surface and the radionuclide contents in air, solid and liquid precipitations, soil, surface waters and sediments, drinking water, foodstuff, feedingstuffs and bio-indicators, when justified.

Sampling locations for measurements within the environmental radioactivity monitoring should be chosen so that the result can serve as a basis for an assessment of the danger to the environment from ionizing radiation and for the public exposure assessment.

Type of samples in which radioactivity is examined, sampling locations and intervals in which the sampling is done are defined in the Programme of Systematic Environmental Radioactivity Examination that is published in the Official Gazette of the Republic of Serbia. The Programme of Systematic Environmental Radioactivity Examination is prepared based on Table 1 enclosed in Appendix 1 to this Rulebook. When preparing the annual programme of systematic environmental radioactivity examination, changes to radioactivity in the environment are taken into account that were recognized based on the results of radioactivity monitoring in the previous years, the new knowledge about the influence of radioactivity on humans and the environment, as well as the budget approved for the programme implementation.

Article 11

Measurements within environmental radioactivity monitoring are done by legal entities authorized for radioactivity monitoring or for particular measurements within the radioactivity monitoring (hereinafter: authorized legal entities).

Authorized legal entities shall perform examinations within the monitoring in accordance with the Programme of systematic environmental radioactivity examination.

Authorized legal entities shall submit a report about the performed measurements in accordance with the regulation governing recordkeeping about performed operations in the field of radiation protection.

Article 12

The report on performed measurements within the radioactivity monitoring contains the following:

1. Review of the environmental radioactivity monitoring programme in tabular form;

2. Used sampling methods and sampling data;

3. Used methods for sample preparation and data on sample preparation;

4. Used measuring methods (measurement time, measuring geometry for samples etc.);

5. Geographic coordinates of sampling sites or measurement sites in cases when the level of exterior radiation is measured;

6. Results of measurements with measuring uncertainties;

7. Measurements results analysis;

8. Remarks on the measurement results.

Review of the measuring results must contain also the time of sampling.

The results of the measurements of radionuclide contents in samples are stated as specific activities of radionuclides.

If the authorized legal entity has justified reasons to suggest changes to the radioactivity monitoring programme, it is obliged to state these in the annual report.

Article 13

The control of the level of radioactive contamination of the environment in the surroundings of the nuclear facility is performed by controlling the emission of radioactive effluents from the nuclear facility and the radionuclide contents in the environment in regular conditions and in case of an emergency.

The control of the emission of radioactive effluents from the nuclear facility can be done by the operator of the nuclear facility or by a legal entity that is independent from the operator of the nuclear facility. The radionuclide contents in the environment in the surroundings of the nuclear facility in regular conditions and in case of an emergency may be measured only by the legal entity that is independent from the operator of the nuclear facility.

Article 14

The level of radioactive contamination of the environment in the surroundings of the nuclear facility is estimated based on the level of external radiation and radionuclide contents in the air, precipitations, surface water and sediments, drinking water, foodstuff, feedingstuffs and bio-indicators, as well as based on the determination of other parameters affecting the contents and distribution of radionuclides in the surroundings.

The testing of the level of external radiation and radionuclide contents in the environment in the surroundings of the nuclear facility is done by measuring the strength of the ambient dose equivalent of the gamma radiation in the air, by measuring the total alpha and beta activity and by measuring the radionuclides' activity in samples from the environment.

Article 15

The control of the level of radioactive contamination of the environment in the surroundings of the nuclear facility is performed in order to:

1. Determine the transmission pathways and critical groups of population;

2. Assess doses received by a critical and other group of individuals from the population and of collective doses received by the population, as well as to control whether received doses exceed the authorized and limit doses for the given nuclear facility;

3. Check the emission;

4. Check and improve, as necessary, the accepted mathematical models for the assessment of radionuclide contents in the environment which is the consequence of emission from the given nuclear facility;

5. Inform the public.

Article 16

Measurements of emissions are done continuously and encompass the determination of single specific activities of all significant radionuclides that are discharged through effluents on all discharge places, by measuring the ambient gamma dose rate equivalent in the air and of the ambient gamma dose equivalent in the air at locations within the fence of the facility, as well as the control of meteorological and hydrological conditions.

Measurements in the sense of paragraph 1 of this Article refer to regular emissions, planned irregular emissions and emissions in case of an emergency.

Article 17

The regularity of the determined emission is checked with periodical intercomparisons of the same samples measurements, encompassing also short-lived radionuclides. For liquid effluents, besides the intercomparisons, also periodical measurements of the representative liquid sample are done.

The checks referred to in paragraph 1 of this Article are done by at least two authorised legal entities.

Article 18

For the assessment of the level of radioactive contamination and doses obtained by means of a mathematical model with emission values for gases and aerosols discharged during normal operation and in case of an emergency, meteorological parameters are used (wind direction, wind speed, stability grades, precipitations etc.) in the surroundings of the nuclear facility. The stipulated values of meteorological parameters in the surroundings of the nuclear facility are used to define meteorological situation that must exist as one of the reasons for the realisation of the planned irregular emission.

Article 19

The continuous collection of meteorological data and their processing is provided by an automated meteorological station within the nuclear facility.

Article 20

For the assessment of the level of radioactive contamination and of doses obtained by the mathematical model from the emission values for liquid effluents discharged to surface water, during normal operation and in case of an emergency, basic hydrological parameters are used that must be continuously registered.

For the assessment of the impact of radioactive liquid effluents on groundwater in the surroundings of the nuclear facility also data about the changes of regimes of groundwater in relation to results from previous examinations are used.

Article 21

The control of the contents of particular radionuclides in the surroundings of the nuclear facility is used in order to:

1. Determine the effective doses for individuals from the population, independently from the measured emission values and models;

2. Check whether the assessed effective doses for the critical group of population are below stipulated authorized limit doses;

3. Control of changes in specific activities of particular radionuclides in different mediums and bio-indicators that can occur over longer periods of time as a consequence of the emission or of other external effects;

4. Check the adequacy of the criteria for the determination of emission values for the given nuclear facility by taking into account also other sources of ionizing radiation (natural and manmade) and by estimating the total public exposure;

5. Check whether the system for effluent treatment is properly functioning, i.e. check the safety measures and protection measures.

Article 22

The measuring of the level of radioactive contamination during an emergency encompasses the following:

1. The emergency level is determined by means of a swift control and by taking adequate samples during or immediately after the emission;

2. Corresponding data are provided for remediation and emergency impact assessment;

3. Data are collected in order to inform the public.

Article 23

The examination of the level of radioactive contamination with particular radionuclides encompasses also all other significant radionuclides of natural and manmade origin in the surroundings of the nuclear facility which are not a consequence of the emission from that nuclear facility, but do contribute to the total public exposure to ionizing radiation.

Article 24

Measurements by means of which the radionuclide contents are determined in the surroundings of the nuclear facility are performed in a laboratory located outside of the radiation impact of the nuclear facility and of other sources of ionizing radiation and facilities, i.e. sources of emissions within the fence of the nuclear facility and which is independent from the operator of the nuclear facility.

Article 25

The selection of particular radionuclides controlled with specific measurements must correspond to expected or determined emission data and encompass radionuclides that provide the largest contribution to the effective dose for an individual from the population. If some of these radionuclides coincide with radionuclides that are present in the surroundings from other sources, it will be necessary to assess the impact of the nuclear facility by performing measurements at reference points where no impact of emission from the nuclear facility is expected.

Article 26

Exceptions from the principle of determining the composition of radionuclides are possible only provided that the isotopic composition is well known and that it does not change over time, or that for the dose assessment the maximum possible exposure was adopted resulting from the potential most unfavourable isotopic composition of the sample.

Article 27

In the case of emergency, the total activities of samples are measured pursuant to Article 26 herein in order to assess the radiation situation, provided that a corresponding check of the isotopic composition is provided thereafter.

Article 28

Sampling and measurement is done in the surroundings of the nuclear facility, on places on which emission impacts can be primarily detected. The selection of sampling sites must be representative. It must encompass reference spots in accordance with the report on nuclear safety in the sense of Article 25 herein and it must show for every transmission pathway the most unfavourable impact of the emission. One part of the programme for emissions in the case of emergencies provides for the control of settlements in the nearest vicinity to the nuclear facility, taking into account the population density and the degree of threat.

Article 29

Concerning continuous sampling, the sampling frequency, i.e. measurements' frequency depends on the half-life of radionuclides, on the time needed for the transmission of radionuclides on the transmission pathway to the human beings and on the duration of discontinuous emissions. The frequency must enable the assessment of mean annual doses under acceptable presuppositions about the constant speed of emission in the sampling interval.

Article 30

In the case of emergency or of irregular planned and larger unplanned emissions, the sampling frequency is adjusted to the needs for the situation assessment, i.e. for the assessment of the increased level of radioactive contamination, in proportion to the assessed degree of threat.

Article 31

For the assessment of the compliance of the exposure level with the authorized effective dose limit, the sensitivity of the equipment and methods must be such to enable that the dose is determined whose value is less than one third of the authorized limit dose.

Article 32

The operator of the nuclear facility determines the annual programme for examination of the levels of radioactive contamination, which contains:

1. Environmental elements (mediums) that are examined and the transmission path;

2. Radionuclides that are examined;

3. Measuring, processing and sampling methods;

4. Designation of locations at which samples are taken or measurements performed;

5. Data about the population;

6. Frequency of sampling and measurements;

7. Measurement parameters and their measuring units;

8. Intercomparison measurements;

9. Criteria for quality assurance of the measurements.

The programme for the level of radioactive contamination examination in the surroundings of the nuclear facility must be developed in the form of tables and maps.

Article 33

The Programme of systematic environmental radioactivity examination in the surroundings of the nuclear facility is performed in accordance with the safety report and is submitted to the Agency to enable it to monitor the implementation of nuclear safety measures.

Article 34

The annual report on the results of examination of the emission and of the radioactive contamination levels in the environment in the surroundings of the nuclear facility contains the following:

1. Introductory explanation (legal basis of the examination, data about the start of the examination, special remarks about the programme implementation, such as changes to sampling and measuring methods and discrepancies from the programme);

2. Short contents of the evaluation;

3. Evaluation of measurement data with the dose assessment;

4. Review of the stipulated programme of measurements in tabular form;

5. Review of processed measuring results in tabular form.

The tables with processed measuring results shall contain the following:

1. Measuring data re-calculated to the average of the sampling time interval with named measuring units and assessment of the total uncertainty of the results;

2. Data about the beginning and ending of the sampling time interval;

3. Mean annual or other representative value of the dose obtained from the data and value that was used for the evaluation of annual doses.

The user of the nuclear facility submits the annual report referred to in paragraph 1 of this Article to the Radiation Protection and Nuclear Safety Agency by the 31th of March of the current year for the previous year, and in the case of an emergency – immediately.

Article 35

Examination of the emission in the surroundings of the research nuclear reactor encompasses all facilities, i.e. emission sources within the fence of the nuclear facility, for which it is assessed that they contribute significantly or comparably to the emission and exposure of the population to ionizing radiation during normal operation, or that they could do that in case of an emergency.

Facilities, i.e. emission sources, in the sense of paragraph 1 of this Article are the following: reactor facility in the narrow sense, storage facility for spent fuel, storage for radioactive waste material, storage for radioactive material, storage for nuclear material, radiochemical facilities, accelerator installation and other.

Article 36

The emission examination, in the sense of Article 35 herein, is performed in a way to enable the assessment of the contribution of particular facility or emission source within the fence of the nuclear facility to the entire emission.

Article 37

Elements for the drawing up of the programme for examination of radioactive contamination in the surroundings of the research nuclear reactor are shown in the Tables that form an integral part of this Rulebook.

Article 38

The emission from the facility for disposal of irradiated nuclear fuel and facilities for the storage, treatment and disposal of radioactive waste are examined based on the nuclear safety report for these facilities.

Article 39

The legal entity authorised for the systematic environmental radioactivity monitoring in the surroundings of the nuclear facility determines the quality assurance programme and the quality control programme for the measurements that are performed pursuant to this regulation.

In the quality assurance programme for measurements the following is determined:

1. The educational qualifications of the staff that will perform the examinations;

2. Reliable analytical procedures and their proper implementation;

3. Proper operation of the measuring equipment;

4. Safekeeping of all final results;

5. Possibility of determination of all measurement uncertinities.

The quality control programme for measurements encompasses the following:

1. Check of the professional qualifications of persons who perform the examination;

2. Check of the quality of the measuring equipment with periodical calibration and maintenance;

3. Verification of the analytical procedures;

4. Use of measuring equipment in metrological connection with national standards, i.e. primary gauges.

The programmes for quality assurance and quality control for measurements referred to in paragraph 2 and 3 of this Article are drawn up by the operator of the nuclear facility based on the final safety report and submitted to the Agency for the purpose of monitoring the implementation of nuclear safety measures.

Article 40

Radioactivity monitoring in case of an emergency is done in order to timely provide:

1. Data about the level and type of external radiation and radioactive contamination;

2. Data that is necessary for the authorities in charge of management in case of an emergency so that they could decide about the necessary protection, remediation and other intervention measures;

3. Data necessary for decision making on the kind and level of protection of units participating in the response to the emergency;

4. Information which is necessary to inform the public about the level of danger;

5. Information which is necessary to identify persons whose health conditions must be monitored in the long run after the emergency;

6. Data for international information exchange.

Article 41

In case of an emergency the competent authorities must, in accordance with the Action Plan in the Case of an Emergency, already in the start phase and for the duration of the emergency, determine and monitor the level of danger and the probable development of events in order to timely recognize new threats or evaluate the consequences of the emergency and decide about the scope and type of protection, remediation and other intervention measures.

Article 42

In case of an emergency, the Agency shall stipulate the sites, extent and frequency of sampling. The Agency will prepare the monitoring programme in case of an emergency in its starting phase and will inform the legal entities authorized to perform measurements within the radioactivity monitoring in the environment. When necessary, changes will be introduced into the monitoring programme when an emergency occurs, depending on the development of the situation.

Article 43

The authorized legal entity which is performing the radioactivity monitoring in an emergency shall, in shortest possible time intervals, notify the Agency about the measurement results during the emergency.

After the end of the emergency, the authorized legal entity which is performing the radioactivity monitoring in an emergency shall submit to the Agency the report on performed measurements at the latest 15 days after the emergency has ended.

Article 44

This rulebook shall enter into force on the eighth day from the date of its publishing in the "Official Gazette of the Republic of Serbia".

Table 1

ELEMENTS FOR THE DRAWING UP THE PROGRAMME OF EXAMINATION OF RADIOACTIVE CONTAMINATION IN THE ENVIRONMENT

Type of sample	Type of examination	Measurement site	Sampling frequency	Measurement frequency	Number of samples per site	Total number of examinations p.a.
Level of external radiation	Ambient gamma dose rate equivalent	At least 9 locations	-	Continuously	-	-
	Ambient gamma dose equivalent	At least 16 locations	-	4 times p.a.	1	64
Air	Determination of radionuclide contents by gamma-spectrometry	Belgrade, Vinča, Subotica, Niš, Zlatibor, Zaječar, Vranje	Continuously	monthly	1	84
Solid and liquid precipitations	Determination of radionuclide contents by gamma-spectrometry	Belgrade, Vinča, Subotica, Novi Sad, Kragujevac, Niš, Zlatibor, Zaječar, Vranje	Continuously	monthly	1	108
	^{90}Sr contents determination	Belgrade, Vinča, Subotica, Novi Sad, Niš, Zlatibor, Zaječar, Vranje	Continuously	monthly	1	108
Soil: - cultivated, at depth 0-20 cm - uncultivated at depths 0-5 cm and 5-15 cm	Determination of radionuclide contents by gamma-spectrometry	Belgrade, Subotica, Novi Sad, Niš, Zlatibor, Zaječar, Vranje	Once p.a.	Once p.a.	3	21
	^{90}Sr contents determination	Belgrade, Subotica, Novi Sad, Niš, Zlatibor, Zaječar, Vranje	Once p.a.	Once p.a.	3	21
Surface water	Determination of radionuclide contents by gamma-spectrometry	Danube (Bezdan)	monthly	monthly	1	12
		Danube (Zemun)	monthly	monthly	1	12
		Danube (Vinča)	monthly	monthly	1	12
		Danube (Prahovo)	monthly	monthly	1	12
		Sava (Sremska Mitrovica)	monthly	monthly	1	12
		Sava (Belgrade)	monthly	monthly	1	12
		Nišava (Pirot)	4 times p.a.	4 times p.a.	1	4

			Tisa (Drina)	4 times p.a.	4 times p.a.	1	4
			Timok (Knjaževac)	4 times p.a.	4 times p.a.	1	4
			Drina (Loznica)	4 times p.a.	4 times p.a.	1	4
		^{90}Sr and ^{3}H contents determinations	Danube (Bezdan)	monthly	monthly	1	12
			Sava (Sremska Mitrovica)	monthly	monthly	1	12
Fluvial sediment		Determination of radionuclide contents by gamma-spectrometry	Danube (Bezdan)	2 times p.a.	2 times p.a.	1	20
			Danube (Zemun)				
			Danube (Vinča)				
			Danube (Prahovo)				
			Sava (Sremska Mitrovica)				
			Sava (Belgrade)				
			Nišava (Pirot)				
			Tisa (Drina)				
			Timok (Knjaževac)				
			Drina (Loznica)				
		^{90}Sr contents determination	Danube (Bezdan)	2 times p.a.	2 times p.a.	1	4
			Sava (Sremska Mitrovica)				
Drinking water		Determining the total alpha and beta activity	Settlements with more than 100,000 citizens	300 ml daily	monthly	1	84
		Determination of radionuclide contents by gamma-spectrometry	Settlements with more than 100,000 citizens	300 ml daily	monthly	1	84
		^{90}Sr and ^{3}H contents determinations	Settlements that provide themselves with drinking water from the Danube and Sava	300 ml daily	4 times p.a.	1	8
Foodstuff	Milk	Determination of radionuclide contents by gamma-spectrometry		300 ml daily	monthly	1	72

		^{90}Sr contents determination	At least one site per region: Belgrade, Vojvodina, Šumadija, Western Serbia, Eastern Serbia, Southern Serbia	300 ml daily	monthly	1	72
	Dairy products	Determination of radionuclide contents by gamma-spectrometry		2 times p.a.	2 times p.a.	1	12
		^{90}Sr contents determination		2 times p.a.	2 times p.a.	1	12
	Meat	Determination of radionuclide contents by gamma-spectrometry		2 times p.a.	2 times p.a.	1	12
		^{90}Sr contents determination		2 times p.a.	2 times p.a.	1	12
	Cereals	Determination of radionuclide contents by gamma-spectrometry		2 times p.a.	2 times p.a.	1	12
		^{90}Sr contents determination		2 times p.a.	2 times p.a.	1	12
	Vegetables	Determination of radionuclide contents by gamma-spectrometry		2 times p.a.	2 times p.a.	3	36
		^{90}Sr contents determination		2 times p.a.	2 times p.a.	3	36
	Fruits	Determination of radionuclide contents by gamma-spectrometry		2 times p.a.	2 times p.a.	2	24
		^{90}Sr contents determination		2 times p.a.	2 times p.a.	2	24

	Baby food	Determination of radionuclide contents by gamma-spectrometry	Belgrade, Novi Sad, Niš	4 times p.a.	4 times p.a.	1	12
		^{90}Sr contents determination	Belgrade, Novi Sad, Niš	4 times p.a.	4 times p.a.	1	12
Feeding stuff		Determination of radionuclide contents by gamma-spectrometry	At least one site per region: Belgrade, Vojvodina, Šumadija, Western Serbia, Eastern Serbia, South Serbia	2 times p.a.	2 times p.a.	At least 3	At least 36
		^{90}Sr contents determination	At least one site per region Beograd, Vojvodina, Šumadija, Western Serbia, Eastern Serbia, Southern Serbia	2 times p.a.	2 times p.a.	At least 3	At least 36

Table 2

ELEMENTS FOR THE DRAWING UP OF THE PROGRAMME FOR EXAMINATION OF RADIOACTIVE CONTAMINATION OF THE ENVIRONMENT SURROUNDING THE NUCLEAR FACILITY

	Type and description of measurement	Measurement, i.e. sampling site	Sample type	Sampling frequency	Measuring frequency	Remark
	LEVEL OF EXTERNAL RADIATION					
1.	Variation in the radiation field in the surroundings of the nuclear facility and early warning of emergency	One/two sites along the direction of the most frequent winds towards the settlement – according to the Safety Report	Ambient gamma dose rate equivalent in the air	Once every 5 s to once every 5 min.	Continuously, automated	Important for early warning of emergency
	Integral values of gamma radiation doses in the given period	Three to four sites along the direction of the most frequent winds towards the settlement – according to the Safety Report	Ambient gamma dose equivalent in the air	TL dosimeters exposed for three months	Once in three months	

2.	AIR					
	Gamma spectrometry analysis	One reference site beyond the reactor's impact	Continuous collection on aerosol filters	Continuously – aggregate monthly	12 times p.a.	
	Specific analysis ^{131}I	Two to three sites along the direction of the most frequent winds towards the settlement – according to the Safety Report	Continuous collection on iodine filters	Continuously – aggregate every 15 days	26 times p.a.	
	Analysis of $^{89/90}Sr$ contents		Continuous collection on aerosol filters	Continuously – aggregate quarterly	4 times p.a.	
3.	PRECIPITATIONS					
	Gamma spectrometry analysis	One reference site beyond the reactor's impact, 2-3 sites along the direction of the most frequent winds towards the settlement – according to the Safety Report	Precipitations with settled dust	Continuously – aggregate monthly	12 times p.a.	
	Analysis of $^{89/90}Sr$ contents			Continuously – aggregate quarterly	4 times p.a.	
	Analysis of ^{3}H contents		Precipitations	Continuously – aggregate monthly	12 times p.a.	
4.	SURFACE WATER					
	Gamma-spectrometry analysis	One reference site upstream from the effluent discharge	Aggregate monthly	Continuous daily collection	12 times p.a.	
	Analysis of $^{89/90}Sr$ contents	One site downstream from the effluent discharge	Aggregate quarterly		Four times p.a.	
	Analysis of ^{3}H contents	One site - recipient of technological water	Aggregate monthly		12 times p.a.	
5.	RIVER SEDIMENT					
	Gamma spectrometry analysis	One reference site upstream from the effluent discharge	Material from the bottom collected with clamping device in a 10	Once p.a.	Once p.a.	
	Analysis of $^{89/90}Sr$ contents	One site downstream				

		from the effluent discharge	cm layer – dry sample			
		One site - recipient of technological water				
6.	DRINKING WATER					
	Gamma spectrometry analysis	Water supply line	Drinking water – aggregate - every six months	Continuous-daily	2 times p.a.	
7.	GROUNDWATER					
	Gamma spectrometry analysis	One spot immediately near the basin for spent fuel, one spot near the storage facility for radioactive waste, water – two to three wells in the area and in the immediate vicinity of the nuclear facility	Water with suspended matter (around 50 l)	One-time or aggregate sample	Periodically, at least once p.a.	Control of the impermeability of the spent fuel storage basin and of the runoff absence of the radioactive waste storage facility
	Analysis of ^{3}H contents					
8.	WASTEWATER					
	Gamma spectrometry analysis	Wastewater before the exit from the fence of the nuclear facility	Representative	Continuously		Continuous supervision of the dilution of wastewater and annual discharges to the river
		Wastewater from the tank for radioactive wastewater		Before the discharge		
9.	SOIL					
	Gamma spectrometry analysis	In the immidiate surroundings of the reactor and storage for RAW material	Depth 0-5 cm, 5-10 cm and 10-15 cm	Two times p. a.	2 times p.a.	
10.	FOODSTUFF					

		Plantations in the immediate surroundings	All kinds of fruit	Seasonal	Three to six times p.a.	
	Gamma spectrometry analysis	Watercourse upstream and downstream from the site of inflow of liquid effluents	Selected fish samples due to the migration properties and feeding specifics	Once p.a.	Once p.a.	