Approved by
Order of the Federal Environmental, Industrial and Nuclear Supervision Service
dated August 19, 2013 No. 362

SAFETY GUIDE IN THE USE OF ATOMIC ENERGY
"RECOMMENDATIONS FOR CONTENT OF DOCUMENTS JUSTIFYING THE REGULATIONS GOVERNING MAXIMUM PERMISSIBLE DISCHARGES OF RADIOACTIVE SUBSTANCES TO THE ATMOSPHERE AND STATUTORY LIMITS ON DISCHARGES OF RADIOACTIVE SUBSTANCES TO THE WATER BODIES"

(RB-085-13)

I. General

1. The safety guide in the use of atomic energy "Recommendations for content of documents justifying the norms of maximum permissible discharges of radioactive substances to the atmosphere and norms of permissible releases of radioactive substances to the bodies of water" (hereinafter referred to as the Safety Guide) has been developed in accordance with Article 6 of the Federal law dated November 21, 1995 No. 170-FZ "On the use of atomic energy" for facilitating compliance with the requirements of the Federal rules and regulations in the use of atomic energy PNAE G-01-011-97 "General provisions for safety assurance of nuclear power plants. OPB-88/97" approved by the Ordnance of Gosatomnadzor of Russia dated November 14, 1997. No. 9, NP-016-05 "General safety assurance provisions of nuclear fuel cycle facilities (OPB NFCF)" approved by the Ordnance of Rostechnadzor dated December 2, 2005. No. 11 (registered by the Ministry of Justice of the Russian Federation on February 1, 2006, registration number 7433), NP-033-11 "General safety assurance provisions of research nuclear installations" approved by Rostechnadzor order No. 348 dated June 30, 2011 (registered by the Ministry of Justice of the Russian Federation on August 29, 2011, registration No. 21700).

2. This Safety Guide contains the recommendations of the Federal Environmental, Industrial and Nuclear Supervision Service (hereinafter Rostechnadzor) on the content of justifying documents provided for establishing the norms of maximum permissible discharges of radioactive substances to the atmosphere and norms of permissible radioactive releases to the bodies of water.

3. This Safety Guide is applicable to the nuclear facilities carrying out radioactive discharges to the atmosphere and releases of radioactive substances to the bodies of water.

4. This Safety Guide is designed for use by Rostechnadzor specialists carrying out assessment and approval of the norms of maximum permissible radioactive discharges to the atmosphere and norms of permissible radioactive discharges to the bodies of water, and the organizations carrying out development of the norms of maximum permissible radioactive discharges to the atmosphere and norms of permissible radioactive discharges to the bodies of water.

5. The requirements of the Federal Rules and Regulations in the Field of Atomic Energy Use may be implemented through the use of methods other than those specified this Safety Guide subject to substantiation of the selected method.

II. Recommendations for the content of documents justifying the norms of maximum permissible radioactive discharges to the atmosphere and norms of permissible radioactive releases to the bodies of water

6. It recommended to draw the documents justifying the norms of maximum permissible radioactive discharges to the atmosphere or norms of permissible radioactive releases to the bodies of water in accordance with the recommendations on the justification content and structure stated in this Safety Guide.

7. The recommended list of sections of the document justifying the norms of maximum permissible radioactive discharges to the atmosphere is contained in Appendix No. 11 to this Safety Guide. Recommendations for the content of sections of the document justifying the norms of maximum permissible radioactive discharges to the atmosphere are stated in Appendix No. 2 to this Safety Guide.

8. Recommended list of document sections justifying the norms of permissible radioactive discharges to the bodies of water is contained in Appendix No. 3 to this Safety Guide. Recommendations for content of the document sections justifying the norms of permissible radioactive releases to the bodies of water stated in Appendix 4 to this Safety Guide.

9. Recommendations for drawing up documents justifying the norms of maximum permissible radioactive emissions to the atmosphere and norms of permitted radioactive releases to the bodies of water stated in Appendix No. 5 to this Safety Guide

Appendix No. 1 to the
Safety Guide in the use of atomic energy "Recommendations for content of documents justifying the norms of maximum permissible radioactive discharges to the atmosphere and norms of permitted releases of radioactive substances to the bodies of water", approved by the Order of the Federal Environmental, Industrial and Nuclear Supervision Service
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RECOMMENDED LIST OF THE DOCUMENT
SECTIONS JUSTIFYING THE NORMS OF MAXIMUM PERMISSIBLE RADIOACTIVE DISCHARGES TO THE ATMOSPHERE

List of sections, which is recommended to include in the document justifying the norms of maximum permissible radioactive discharges to the atmosphere:

Introduction;

Section 1. General information about the organization and its activity;

Section 2 Characteristic of the organization as the source of radioactive discharges to the atmosphere;

Section 3 Local conditions for building dose burdens on the population;

Section 4 Transfer model of admixture in the atmosphere and calculation of the norms of maximum permissible discharges;

Section 5 Characteristic of the existing current radioactive contamination of the location;

Conclusion

Appendix No. 2
to the Safety Guide in the use of atomic energy "Recommendations for content of documents justifying the norms of maximum permissible discharges of radioactive substances to the atmosphere and norms of permitted releases of radioactive substances to the bodies of water", approved by the Order of the Federal Environmental, Industrial and Nuclear Supervision Service dated
August 19, 2013 No. 362

RECOMMENDATIONS
ON CONTENT OF THE DOCUMENT SECTIONS JUSTIFYING THE NORMS OF MAXIMUM PERMISSIBLE DISCHARGES TO THE ATMOSPHERE

Introduction

The following information is recommended to present in the "Introduction" section:

name of the organization for which the document justifying norms of maximum permissible radioactive discharges to the atmosphere is prepared (hereinafter the Justification);

list of documents, in compliance thereof the Justification has been developed;

information on Justification the developer.

Section 1. General information on organization and its activity

It is recommended to provide the following in this section:

full name of the organization, form of incorporation, registered address, place of business address of legal entity;

brief general information on types of business activities;

category of facility by potential radiation hazard (in accordance with the classification accepted in SP 2.6.1.2612-10 "Basic sanitary rules of radiation safety assurance (OSPORB-99/2010)" approved by the Resolution of the Chief Health Inspector of the Russian Federation dated April 26, 2010 No. 40 (registered by the Ministry of Justice of the Russian Federation on August 11, 2010, registration number No. 18115);

if required - information on planned new business activities or changes in the processes after the start of implementation thereof new sources of discharges of radioactive substances to the atmosphere may occur or the existing may change;

information on settlements (name, location and population strength), located in a thirty kilometer area from the source of discharges.

Section 2 Characteristic of the organization as the source of radioactive discharges to the atmosphere

It is recommended to give a short general description of the applied processes following which discharges are made sufficient to justify the radionuclide composition and other characteristics of the discharges, and description of the organized, unorganized, point, linear and areal sources of radioactive discharges to the atmosphere related to these processes.

The sources of discharge may be pipes, ventilation shafts, aeration skylights, gas ducts, air ducts, places of loading, unloading or storage of raw material, materials, products and substances, leakage, from where radioactive substances enter the atmosphere, as well as the radioactive wastes located at the industrial site or in the sanitary protection zone of the organization or radioactive substances on the propagation path thereof there are no barriers excluding their direct contact with the atmosphere (for example, surfaces of the tailing pit covered with dust).

In this section it is recommended to describe the displacement processes of discharged radionuclides in the process equipment and environments starting from the time of their generation in the sources of discharge up to the time of entry into the atmosphere. In addition it is recommended to describe the change of chemical and physical form of displaced radioactive substances, parameters of the processes of capturing and decontamination (cleanup coefficients on the filters and retention time), to which the radioactive substances are subject.

In the description it is recommended to place information in such manner that a separate structural unit of the text corresponded to each source of discharge where all the processes leading to the discharge are described, moreover it is recommended to give a description of the connection with the sources of radioactive discharges for each ventilation system, which is related to the considered source of discharge. If different sources of discharge have difficult joint configuration, for example "pipe in pipe", this fact is also recommended to reflect in the description.

It is recommended to give the results of inventory stock taking of radioactive discharges to the atmosphere as well as the following characteristics and data for each of the existing and newly created source of discharge:

type of discharge sources (organized, unorganized);

type of source (point, linear, areal);

radionuclide composition, values of actual discharges of each standardized radionuclide from each source;

geometric characteristics of the sources, sizes of buildings, dispersion of aerosol components, chemical and aggregate composition of discharges;

thermo-hydrodynamic characteristics of gas-air mixture in composition thereof the radioactive substances are discharged from the source (temperature, rate and flow rate of discharged gas-air mixture);

the findings of the discharge dynamics by years for the period of no less than five years or engineering estimates with provision of yearly average discharge, dispersion range (dispersion) of its values, possible maximum values;

operating nuclear island cards of the organization and its sanitary protection zone (specifying all the sources of discharges and buildings, location of buildings and configuration of constructions), and surveillance area cards.

The specified information concerning description of the source type, radionuclide composition of the discharges from it, geometric characteristics of the sources, thermo-hydrodynamic characteristics, chemical and aggregate composition of the discharges is recommended to present in the scope according to the tables No. 1 - 4 of this Appendix (in the table No. 3, 4 of this Appendix the unorganized surface sources are not included, discharges thereof are captured and discharged as part of the discharges of organized sources).

Table 1

CHARACTERISTICS OF THE DISCHARGE SOURCES

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Inventory number of the source and ventilation system | Source type | Type of organized source | Number of sources combined under one number | Length, width and height of building, m | Source height, m | Dimensions of source neck | Source coordinates on outline map | Area of areal source, sq. m (volume, occupied by radioactive substance, cu.m; density of source material, kg/cu.m) | Source operation time | Volume (consumption) of gas-air mixture, cu.m/sec (full consumption, cu.m) | Temperature of gas-air mixture, °C | Name of discharged radioactive substance | Mean particle diameter (or activity median aerodynamic diameter) and dispersion of the particle distribution density function, µm  | Note |
| Circular neck | Rectangular neck |
| diameter, m | length, m | width, m | X1 | Y1 | X2 | Y2 |
| Warm | Cold | Warm | Cold |  |  |  |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(name of territorially autonomous subdivision of the economic entity) |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Note.

Inventory number is specified in the column 1 for an organized source as well as notations of vent systems related with it.

Source type is specified in the column 2 (organized, unorganized).

Type of organized source (pipe, ventilation shaft, aeration skylight, deflector, stack and other sources) is specified in the column 3.

Number of sources combined under one inventory number is specified in the column 4.

The outline dimensions of the building on which the source of discharge is located (if the source is located directly on the ground, the column is not filled) are specified in the column 5.

The source height is given in the column 6. In cases when the source is located on the building roof, in addition its height with respect to the roof is specified in brackets. In cases when the source is located not above the ground surface of the slurry pit), it is considered as unorganized and approximated by the areal source with height equal to 0 m. If the source is located not above the ground level, but this facility (for example vent stack) is equipped with a ventilation system with discharges above the ground surface, then these sources are considered as organized, their height is taken as equal to 0 m, and the actual height of rise of the discharge above the ground surface conditioned by heat and dynamic processes is specified in brackets.

The diameter of organized source with circular neck, length and width of the source with rectangular neck are specified in the columns 7 - 9.

The columns 12 - 14 are not filled when describing solitary point sources; for point sources with circular neck the columns 8 - 9 are filled.

The values of coordinates X1 and Y1, X2 and Y2 are specified in the columns 10, 11, 12 and 13. Only X1 and Y1 are specified for the point sources, coordinates of the source ends are specified for the linear sources (X1, 1 and X2, Y2), for the horizontal areal sources (for example, slurry pits) the coordinates of the peaks of the polygon restricting the source are specified in pairs and sequentially in a column in the columns 12 and 13. The values of the coordinates X1 and Y1 are specified in the columns 10, 11 for the non-horizontal sources (for example, window and door openings), and the columns 12 and 13 are not filled.

The area of the areal source is specified in the column 14, moreover, if the horizontal areal source is additionally characterized by the vertical distribution of radioactive substance (for example, deep down the ground in the case of slurry pits), then the scope of radioactive substance in the source and density of source material are specified in brackets separated by commas. Alternatively, when the surface of the areal source is not horizontal, for example near the window and door openings, it is recommended to specify area of opening in this column. This column is not filled if there are sources different from areal sources.

The columns 7 - 9, 16 - 19 are not filled for unorganized sources.

The operation time of the source during a day in the format hh:mm - hh:mm is specified in the column 15. The description of the temporary operation modes of the source for exceeding a day, specification of the outage periods within a year is given in the column "Note" or in individual description to the given table. The time is not specified for the unorganized sources.

The mean consumption of gas-air mixture from the source for the hot and cold periods of the year respectively. The complete flow rates for the hot and cold periods of the year are specified in the brackets after the values of average flow rates of gas-air mixture specified in the chapters 16 and 17. If the separate data for hot and cold periods are absent it is allowed to give the average flow rate of gas-air mixture for the year (cu.m/sec) and corresponding full annual flow rate (cu.m).

The mean temperatures of the gas-air mixture during the hot and cold periods of the year respectively are given in the columns 18 and 19. If separate data for hot and cold period is not available, it is allowed to give average annual temperature.

The columns 16 - 19 are filled for organized sources.

The name of radioactive substance that should not be confused with the name of the radionuclide.

Information (if available) is specified in the column 21 on dispersion of discharged radioactive substance is specified in the column 21: values of the mean diameters of particles of the discharged admixture is given and the dispersion functions of their (diameters) distribution is given The value of the activity median aerodynamic diameter of mixture is given instead of the specified parameters (if available) and the density value of the admixture material is given in the brackets.

Table 2

INFORMATION CHARACTERIZING RADIONUCLIDE COMPOSITION OF DISCHARGES OF THE ORGANIZED SOURCES

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Name of a territorially autonomous subdivision of economic entity to which the sources belong | Radionuclide name | Radionuclide activity generated at the source of discharge, Bq/year | Including | From that received fr cleanup | Total discharged to the atmosphere, Bq/year |
| discharged without cleanup, Bq/year | enters for cleanup, Bq/year | discharged to the atmosphere, Bq/year | Captured and decontaminated |
| actual, Bq/year | of which disposed, Bq/year |
| Source 1 (inventory number and vent systems with which it is related) |
| radionuclide 1 |  |  |  |  |  |  |  |
| radionuclide 2 |  |  |  |  |  |  |  |
| ... |  |  |  |  |  |  |  |
| radionuclide n |  |  |  |  |  |  |  |
| Source 2 (inventory number and vent systems with which it is related) |
|  |  |  |  |  |  |  |
| Source n (inventory number and vent systems with which it is related) |
|  |

Table 3

INFORMATION ON RADIONUCLIDE COMPOSITION OF FUGITIVE SITE SOURCES OF DISCHARGES CHARACTERIZED BY VERTICAL DISTRIBUTION OF RADIOACTIVE SUBSTANCE

|  |  |  |  |
| --- | --- | --- | --- |
| Number and name of a territorially autonomous subdivision of economic unit to which the sources belong | Radionuclide name | Radionuclide specific activity in the source material, Bq/kg | Radionuclide volumetric activity in the source material, Bq/cu.m |
| Source 1 (inventory number) |
| radionuclide 1 |  |  |
| radionuclide 2 |  |  |
| ... |  |  |
| radionuclide n |  |  |
| Source 2 (inventory number) |
|  |  |  |
| Source m (inventory number) |
|  |  |  |

Table 4

INFORMATION ON RADIONUCLIDE COMPOSITION OF FUGITIVE SITE SOURCES OF DISCHARGES CHARACTERIZED BY LACK OF VERTICAL DISTRIBUTION OF RADIOACTIVE SUBSTANCE

|  |  |  |
| --- | --- | --- |
| Number and name of a territorially autonomous subdivision of economic unit to which the sources belong | Radionuclide name | Surface activity of radionuclide source, Bq/sq.m |
| Source 1 (inventory number) |
| radionuclide 1 |  |  |
| radionuclide 2 |  |  |
| ... |  |  |
| radionuclide n |  |  |
| Source 2 (inventory number) |
|  |  |  |
| Source m (inventory number) |
|  |  |  |

Section 3 Local conditions for building dose burdens on the population

In this section it is recommended to give the initial meteorological, hydrological, demographic, radioecological and other parameters characterizing overall the local conditions for building dose burdens on the population.

The measured data on frequencies of events consisting in the implementation of n-th wind direction, j-th category of atmospheric stability and k-th wind speed is required to be given as the meteorological parameters. Data on the implementation frequencies is recommended to be given for the cold and warm periods of the year individually specifying the sum of long-term observations for the cold and warm periods of the year. The representation of frequencies  and  is recommended to be taken such that for their entire totality the unit normalization conditions were met (considering windless conditions). If the organized sources or their groups, operated at different time during a day (hh:mm - hh:mm) are available at the organization, the  and  are also given, calculated on selection of conditions implemented for the time hh:mm - hh:mm, characteristic for the operation of each source group, where the aggregate of values  and  determined for each time interval is recommended to calculate in such a way that the norming condition for unit (considering windless conditions) was met.

For category 3 and 4 of potential radiation hazard facilities:

if the data accounting for the implementation frequency of the stability categories of atmosphere are not available, it is recommended to give the repeatability of the wind directions in various rhumbs and average annual wind speed in each of the rhumbs measured at the wind vane elevation;

if data specified in the previous paragraph is not available, it is recommended to give the repeatability of the wind directions in different rhumbs and average annual wind speed at the wind vane elevation;

for the cases specified above it is possible to provide average annual meteorological data assessed without considering implementation during a year of warm and cold periods.

It is recommended to give data on population distribution and density at the location of the organization by radii and rhumbs considering the population growth prospect and with the specification of the names of inhabited settlements as demographic parameters.

Information related to hydrological parameters is given if there bodies of water within a radius of thirty kilometers around the organization being homogeneous (water reservoir, lake, sea gulf for which the rate of mixing of water masses within the body of water is much greater than the rate of water exchange with the external part of the water system).

If there is only one body of water meeting the homogeneity criterion, then for it is recommended to give the following data:

water surface area of the body of water;

catchment basin area of the body of water;

volume of water in the body of water;

average depth of the body of water;

annual evaporation volumes of the surface run-off, filtration and water intake for process needs of the organization, for which the document justifying the norms of maximum permissible radioactive discharges to the atmosphere is prepared, and annual water intake volumes for process needs by other organizations carrying out water use by the body of water if such data are available;

information on use of the body of water as source of drinking water.

If there are several bodies of water meeting the homogeneity criterion it is recommended to select one water body characterizing the maximum volumetric activity of radionuclides as compared to other water bodies, conditioned by the annual fall-out on its catchment area from the actual or design releases.

It is recommended to present the following as the radio-ecological parameters for each food and forage crops growing at the location of the organization:

areas nearest to the organization of crop acreages occupied by each crop (sq.m.);

annual consumptions of various food products of those age groups, which in accordance with the radiation safety norms are critical for the radionuclides released by the organization (food ration of residents), kg/year;

share of food product produced at the location of organization in the annual consumption of this food product;

initial detention coefficient average for the vegetation time of the crop, sq.m/kg;

yield of this crop on one square meter of soil, kg/sq.m;

mass of vegetative part of the crop for unit area of the soil at the time of harvesting, kg/sq.m;

content of dry substance in the productive parts of the crop;

time between the spring tillage and start of the crop blossoming period, days:

duration of the crop blossoming period, days;

vegetation period of the fruit parts of the crop (time from the start of blossoming to start of harvesting), days;

duration of harvesting, days;

interval between the harvesting and food product arrival at the storage or for processing, days;

time period for which the given food products are consumed, days;

duration of winter pause of crop growth, days;

date of spring tillage;

date of crop sowing.

It is recommended to give the annual levels (mm/year) of liquid, mixed and solid types of sediments as the radio-ecological parameters characterizing the cleanup processes of the plume of radionuclides due to wet removal conditioned by atmospheric precipitations. If such data are not available it is allowed to specify the total annual precipitation level.

It is also recommended to specify the following in this section:

air temperatures average for the warm and cold periods of the year characteristic for the location of the organization, or dependence of the annual air temperature variation by month;

estimate roughness height of underlying surface.

Section 4 Transfer model of foreign matter in the atmosphere and calculation of the norms of maximum permissible releases;

In this section it is recommended to provide the description of foreign matter transfer model implementation in the atmosphere and calculation methods of the norms of maximum permissible releases. If software was used for calculation of the norms of maximum permissible releases, it is recommended to give a description of the methods implemented in it and information on its validation.

It is recommended to show how the following were considered on description of the foreign matter transfer model in the atmosphere:

scattering properties of the atmosphere;

dynamic and thermal lift of the plume along the trajectory up to its maximum value;

initial dilution in the source of release and in the aerodynamic shade if the release takes place at the building height;

accumulation of daughter and removal of mother radionuclides during presence of radionuclides in the plume;

cleanup of the plume due to dry deposition and wet (during precipitations) removal;

wind speed variation with altitude;

impact of undulating topography.

Following the calculations on the transfer model of foreign matter in the atmosphere it is recommended to provide information about the critical point, which is characterized by the maximum values of the annual committed effective dose received by a member of the public belonging to the critical group from all the radionuclides outside the operating nuclear island (for category 3 and 4 facilities by potential radiation hazard) or outside the sanitary protection zone (for the category 1 and 2 facilities by potential radiation hazard) of the organization conditioned by the impact of the entire aggregate of the sources of discharges of the organization and calculated using the following exposure pathways:

external exposure from the discharge cloud;

external exposure from fall-outs on the ground surface due to the dry deposition and wet clearance of radionuclides from the discharge cloud;

internal exposure due to inhalation of radionuclide from the discharge cloud;

inner exposure due to ingestion intake of radionuclides with the food products, produced in the organization layout area.

It is recommended to give information about the used dose coefficient values used during the calculations specifying the sources from where they were taken for each of the above specified paths.

It is recommended to present the dose limitations for the purposes of compliance assistance thereof the norms of maximum permissible radioactive discharges to the atmosphere are developed.

It is recommended to present the assurance criterion of maintaining favorable conditions of the footprint and stable functioning of the natural environmental systems, natural and man-modified natural objects, and safeguarding the biological species diversity for the purposes of compliance assistance thereof the norms of maximum permissible discharges of radioactive substances to the atmopshere are developed.

The calculation results for the transfer model of foreign matter in the atmosphere is recommended to present in the scope specified in table 5 of this Appendix. It is recommended to present the calculation results of the norms of maximum permissible discharges in the scope specified in table 6 of this Appendix.

Table 5

CALCULATION RESULTS ON FOREIGN MATTER TRANSPORT MODEL IN ATMOSPHERE

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Radionuclide | Coordinates of critical point | Hrcloudshine,mSv/year | Hrgroudshine,mSv/year | Hrinh,mSv/year | Hring,mSv/year | Cvr, Bq/m3 | Csr, Bq/ (year x sq.m) | Gr с/m3 | Grz1/m2 |
| Radionuclide 1 | x, y |  |  |  |  |  |  |  |  |
| Radionuclide 2 |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |

Note.

Hrcloudshine - effective dose of external radiation from radionuclide radiation r, located in the discharge cloud;

Hrgroudshine - effective dose of external radiation on fall out of radionuclide r on the ground surface due to the dry deposition and wet clearance of radionuclides from the plume;

Hrinh - effective dose of inner exposure due to inhalation of radionuclides from the discharge cloud;

Hring - effective dose of inner exposure due to ingestion intake of radionuclides with the food products, cultivated in the organization layout area;

Cvr - average annual volumetric activity (concentration) of r-th radionuclide in air;

Csr - annual deposition of radionuclide r on the soil;

Gr - average annual meteorological factor of dilution of the radionuclide r concentration;

Grz - deposition factor due to dry deposition processes and wet segregation of radionuclide r from the discharge cloud.

All the parameters listed above are determined for the actual or design discharges.

Table 6

CALCULATION RESULTS OF THE NORMS OF MAXIMUM PERMISSIBLE DISCHARGES

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| S. No. | N and/or name of the discharge source | Name of radioactive substance (radionuclide) | Form of discharge (gas, aerosol, chemical form) | MPDr, Bq/year | Actual annual discharge per year preceding the period for which permit is requested , or annual discharge assessed according to construction (reconstruction) design document data, Bq/year |
| 1 | 2 | 3 | 4 | 5 | 6 |
| 1. | Source 1 | Radionuclide 1Radionuclide 2...Radionuclide m1 |  |  |  |
| 2. | Source 2 | Radionuclide 1Radionuclide 2...Radionuclide m2 |  |  |  |
| ... | ... | .... | ... | ... | ... | ... | ... |
| n. | Source n | Radionuclide 1Radionuclide 2...Radionuclide mn |  |  |  |  |  |

Section 5 Characteristic of the existing current radioactive contamination of the location

In this section it is recommended to present the following information on the current existing radioactive contamination of the location at the operating nuclear island, in the sanitary protection zone and surveillance area with assessment of the contribution to it due to previous activity of the organization:

radionuclide content in the bottom sediments of homogeneous water bodies;

content of radionuclides in the food products;

Radionuclides content in fish tissues;

Radionuclides content in the near ground layer of the atmospheric air;

Radionuclide content in the atmospheric precipitations;

content of radionuclides in the soil;

Radionuclides content in water of the water bodies;

Content of radionuclides in vegetation;

monitoring results of the dose rate of external gamma-radiation.

Conclusion

The general conclusions on the performed works are recommended to be given in the "Conclusion" section.

It is recommended to conclude that the actual or design releases exceed or do not exceed the values of developed norms of permissible releases of radioactive substances to the atmosphere based on the actual or design values of the radioactive discharges to the atmosphere and considering the aggregate impact of the sources of releases and released radionuclides.

It is also recommended to give information on radiological control of radionuclide discharges specifying the periodicity of control, points of control, characteristics of measuring apparatus (range of measurements) and justification of the sufficiency of radiological control for the purposes of confirming the non-exceedance of the norms of permitted discharges.

Appendix No. 3
to the Safety Guide in the use of atomic energy "Recommendations for content of documents justifying the norms of maximum permissible discharges of radioactive substances to the atmosphere and norms of permitted releases of radioactive substances to the bodies of water", approved by the Order of the Federal Environmental, Industrial and Nuclear Supervision Service
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RECOMMENDED LIST OF THE
DOCUMENT SECTIONS JUSTIFYING THE NORMS OF MAXIMUM PERMISSIBLE RADIOACTIVE RELEASES TO THE BODIES OF WATER

List of sections, which is recommended to include in the document justifying the norms of maximum permissible radioactive releases to the bodies of water:

Introduction;

Section 1. General information about the company;

Section 2 Characteristic of the organization as the source of radioactive releases to the bodies of water;

Section 3 Characteristic of the local conditions of formation of dose burdens on the population;

Section 4 Model and results of calculation of the norms of permissible releases in to the bodies of water;

Section 5 Characteristic of the existing current contamination of the water bodies;

Conclusion

Appendix No. 4
to the Safety Guide in the use of atomic energy "Recommendations for content of documents justifying the norms of maximum permissible discharges of radioactive substances to the atmosphere and norms of permitted releases of radioactive substances to the bodies of water", approved by the Order of the Federal Environmental, Industrial and Nuclear Supervision Service
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RECOMMENDATIONS
FOR THE CONTENT OF THE DOCUMENT SECTIONS JUSTIFYING THE NORMS OF MAXIMUM PERMISSIBLE RADIOACTIVE RELEASES TO THE BODIES OF WATER

Introduction

The following information is recommended to present in the "Introduction" section:

name of the organization for which the document justifying norms of maximum permissible radioactive releases to the bodies of water is prepared (hereinafter the Justification);

list of documents, in compliance thereof the Justification has been developed;

information on Justification the developer.

Section 1. General Information about the Company

It is recommended to provide the following data in this section:

full name of the organization, form of incorporation, registered address, place of business address of legal entity and its individual manufacturing territories;

brief general information on types of business activities;

category of facility by potential radiation hazard

if required - information on planned new business activities or changes in the processes after the start of implementation thereof new sources of discharges of radioactive substances to the atmosphere may occur or the existing may change;

information on the nearest settlement to the source of radioactive discharges, the population thereof is water user of the body of water;

maps of the operating nuclear island specifying all the sources of discharges as well as its sanitary and protection zone and surveillance zone.

Section 2 Characteristic of the organization as the source of radioactive releases to the bodies of water

In this section it is recommended to give a brief general description of the processes carried out at the organization following which discharges are made sufficient to justify the radionuclide composition and other characteristics of the discharges. It is also recommended to describe the discharge devices related to these processes.

In this section it is recommended to describe the displacement processes of discharged radionuclides in the process equipment and environments starting from the time of their primary inclusion in the composition of displaced radioactive substances in the sources of discharge up to the time of entry into the body of water. In addition the changes of chemical and physical form of displaced radioactive substances, parameters of the processes of cleanup and decontamination (cleanup coefficients on the filters, retention time etc.), to which the radioactive substances are subject to are described. It is recommended to develop the description in such manner that a separate operational text unit corresponded to each discharge device where all the processes leading to discharge through the given discharge device are described. It is recommended to describe the relation of each piping related to the considered discharge device with the sources of radioactive discharge. If different discharge devices have complex configuration, for example joint configuration, this fact is also recommended to reflect in the description.

The following characteristics and data are given for each existing and developed discharge device:

radionuclide composition, values of actual annual discharges of each standardized radionuclide from each discharge device;

geometric characteristics of discharge devices, their dimensions and configuration, chemical composition of the discharges;

thermo-hydrodynamic characteristics of the environment, in composition thereof radioactive substances are discharged from the discharge device (temperature and flow rate of medium);

results of examination of the dynamics of discharges by years for a period of at least five years or design assessments with presentation of: average annual discharge, dispersion range (dispersion) of its values, possible maximum values;

operating nuclear island maps of the organization, its sanitary protection zone and surveillance zone (specifying all the discharge devices, bodies of water and settlements);

information on discharge meters.

The specified information with respect to values of actual annual discharges, their radionuclide composition and hydrodynamic characteristics of discharge devices is required to submit in the scope specified in the table No. 7 and 8 of this Appendix.

Table 7

HYDRODYNAMIC CHARACTERISTICS OF DISCHARGE DEVICES

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Discharge device | Name of body of water - discharge receiver | Quantity of diverted effluents, m3/year | Quantity of effluents undergoing cleanup, m3/year | Design capacity of treatment facilities, m3/year | Category of effluents (production, storm water, drainage, filtration) |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

Table 8

RADIONUCLIDE COMPOSITION OF DISCHARGES OF THE ORGANIZATION

|  |  |  |
| --- | --- | --- |
| Discharge device | Name of body of water - discharge receiver | Radionuclide discharge, Bq/year |
| Radionuclide 1 | Radionuclide 2 | ... | Radionuclide n |
| Source 1 |  |  |  |  |  |
| Source 2 |  |  |  |  |  |
| ... |  |  |  |  |  |
| Source m |  |  |  |  |  |

Section 3 Characteristic of the local conditions of formation of dose burdens on the population

In this section it is recommended to give the initial hydrological, demographic, radio-ecological parameters characterizing overall the local conditions for building dose burdens on the population.

If the organization carries out releases to a body of water being a homogeneous water course, it is recommended to provide the following information:

minimum water flow for the last thirty years (without considering the contribution of discharge devices);

depth of water course conforming to the minimum depth for the last thirty years of water flow in it;

width of the water course conforming to the minimum water flow in it for the last thirty years;

velocity of water course conforming to the minimum velocity for the last thirty years of water flow;

lateral distance from the shore line to the discharge device;

hydraulic scope.

If the organization discharges to the body of water being a homogeneous body of water, examples thereof being a small lake, pond, small water reservoir or inundated quarry, it is recommended to provide the following information about this facility:

water surface area;

catchment basin area;

volume of water;

mean depth;

annual evaporation volumes of the surface run-off, filtration and water intake for process needs of the organization, for which the document justifying the norms of maximum permissible radioactive releases to this body of water is prepared, and annual water intake volumes for process needs by other organizations carrying out water use by this body of water if such data are available;

If the organization discharges to the body of water being a homogeneous body of water, examples thereof being a large lake, pond, large water reservoir, sea, gulf or its part, it is recommended to provide the following information about this facility:

coastal current velocity at the location of the discharge device, which if there are no field results may be taken as equal to 1 m/sec;

lateral distance from the shore line to the discharge device;

depth at the discharge device location.

Apart from information specified above characteristic for specific types of water bodies, it is recommended to give the values of distribution coefficients between water and bottom deposits of the bodies of water for the chemical elements, with the radionuclides being isotopes thereof, as well as the following information:

whether the body of water is used as a source of drinking water or not;

whether pastures or other agricultural territories are irrigated from the body of water or not;

whether there is irrigated cropping near the location of the organization or not;

whether there are flood lands near the location of the organization subject to inundation during seasonal flood and used for agricultural purposes or not.

If the organization carries out releases to several different bodies of water, it is recommended to give detailed information about the fluid communication of these bodies of water with each other, as well as with the bodies of water where direct release is not made. It is recommended to include the annual inflow volumes of water from one body of water to another in the specified information. This information is recommended to be given both in the event of availability of natural hydrological connection between the bodies of water and on availability of artificially created fluid communication.

Section 4 Model and results of calculation of the norms of permissible releases into the bodies of water

In this section it is recommended to provide the description of radionuclide transfer model implementation in water medium and calculation methods of the norms of permissible releases. If software was used for calculation of the norms of permissible releases, it is recommended to give a description of the methods implemented in it and information on its validation.

It is recommended to show how the following were considered on implementation of the radionuclides transfer model in water medium:

change of concentration of each of the discharged radionuclides in water of the body of water starting from the time of release from the discharge device and ending with the time of reaching the sections where water is used;

water exchange between different bodies of water being both direct receivers of the discharges and those where direct release through the discharge devices is not made;

accumulation of radionuclides in bottom sediments.

It is recommended to give the values of the dilution factors of the radionuclides concentration in water of the critical sections as results of the calculations on transfer model of radionuclides in the water medium.

It is recommended to show how the following exposue pathways were accounted for:

external exposure from residence at the flooded lands where the radionuclides have been accumulated;

external exposure from temporary stay at the beach, radionuclides have been accumulated in the sands and soil thereof;

external exposure from residence at the irrigated lands where the radionuclides have been accumulated;

external exposure from radionuclides, suspended or dissolved in water of the body of water, during swimming or sailing in a boat;

internal exposure from fish consumption;

internal exposure from drinking water consumption;

internal exposure from consumption of milk or butcher's meat with the body of water used as water-hole for the cattle;

internal exposure from consumption of milk or butcher's meat, for the cattle grazing on the irrigated pastures;

internal exposure from consumption of vegetables from the fields irrigated with water from the body of water;

internal exposure form inhalation of suspended particles during human presence at the irrigated territory;

internal exposure from inhalation of tritium vapors;

other exposure pathways.

It is recommended to give information about the used dose coefficient values used during the calculations specifying the sources from where they were taken for each of the above specified paths.

It is recommended to present the limitations, based on and for purposes of assistance of complying thereof the norms of permissible radioactive releases are developed (for example, dose quota etc established for the organization), it is also recommended to give the conservatively calculated parameters using actual or design annual discharges, which are subject to comparison specifying the limitations.

Information on the values of calculated norms of permissible releases of radioactive substances to the bodies of water is recommended to present in the scope specified in the table 9 of this Appendix.

Table 9

NORMS OF PERMISSIBLE RADIOACTIVE RELEASES TO THE BODIES OF WATER

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| S. No. | Name of subdivision (shop, factory) | No. and/or name of release source | Name of body of water - discharge receiver | Name of radioactive substance (radionuclide) | Discharge norm, Bq/year (DSr) |
|  |
| 1 | 2 | 3 |  | 4 | 5 |
| 2 |  |  |  |  |  |
|  |  |  |  |  |  |
| 2 |  |  |  |  |  |
|  |  |  |  |  |  |
|  | Total for the division: |  |  |  |  |
|  | Overall for the production territory: |  |  |  |  |

Section 5 Characteristic of the existing current contamination of the water bodies

In this section it is recommended to provide the following information on the existing current contamination of the water bodies in close proximity to the organization and at the places of most probable use by the population residing in close proximity to the organization:

radionuclide content in the bottom sediments of homogeneous water bodies;

Radionuclides content in fish tissues;

Radionuclides content in sources of water supply;

Radionuclides content in water of the water bodies.

Conclusion

The general conclusions on the performed works are recommended to be given in the "Conclusion" section.

It is recommended to conclude that the actual or design releases exceed or do not exceed the values of developed norms of permissible releases of radioactive substances to the bodies of water based on the actual or design values of the releases of radioactive substances to the bodies of water and considering the aggregate impact of the sources of releases and released radionuclides.

It is also recommended to give information on radiological control if discharges of radionuclides specifying the periodicity of control, points of control, characteristics of measuring apparatus (range of measurements) and justification of the sufficiency of radiation control for the purposes of confirming the non-exceedance of the norms of permitted releases.

Appendix No. 5
to the Safety Guide in the use of atomic energy "Recommendations for content of documents justifying the norms of maximum permissible discharges of radioactive substances to the atmosphere and norms of permitted releases of radioactive substances to the bodies of water", approved by the Order of the Federal Environmental, Industrial and Nuclear Supervision Service
dated August 19, 2013 No. 362

RECOMMENDATIONS
FOR PREPARATION OF DOCUMENTS JUSTIFYING THE REGULATIONS GOVERNING MAXIMUM PERMISSIBLE DISCHARGES OF RADIOACTIVE SUBSTANCES TO THE ATMOSPHERE AND STATUTORY LIMITS ON DISCHARGES OF RADIOACTIVE SUBSTANCES TO THE WATER BODIES

The documents justifying the norms of maximum permissible discharges of radioactive substances to the atmosphere and norms of permissible releases of radioactive substances to the bodies of water (hereinafter the Justification) are recommended to executed in the text editor format MS Word on one or two sides of A4 format sheet with one and half line spacing. The recommended font size for the main text is at least 12.

Justification of the norms of maximum possible discharges of radioactive substances to the atmosphere is recommended to present in the form of a document "Justification of the norms of maximum possible discharges of radioactive substances to the atmosphere".

Justification of the norms of permissible releases of radioactive substances is recommended to present in the form of a document "Justification of the norms of permissible releases of radioactive substances to the surface bodies of water".

On documenting the Justification it is recommended to follow the following basi rules of data presentation:

specify the dates in dd.mm.yyyy format (for example, 17.03.1982);

denote the name of radionuclides with the chemical symbol specifying the mass number of the isotope (for example, Co-60, Cs-137);

present the numerical values (excluding integer values, expressed in pieces) to two decimal places (for example, for positive degree - 4.15 x 1011, for negative degree - 2.89 x 10-5).