UNSCEAR Evaluation of Public Exposure to Ionizing Radiation from Natural and Man-made Sources

Task 2
NATURAL RADIATION SOURCES (OTHER THAN RADON) AND ENHANCED SOURCES OF NATURALLY OCCURRING RADIOACTIVE MATERIAL (NORM)

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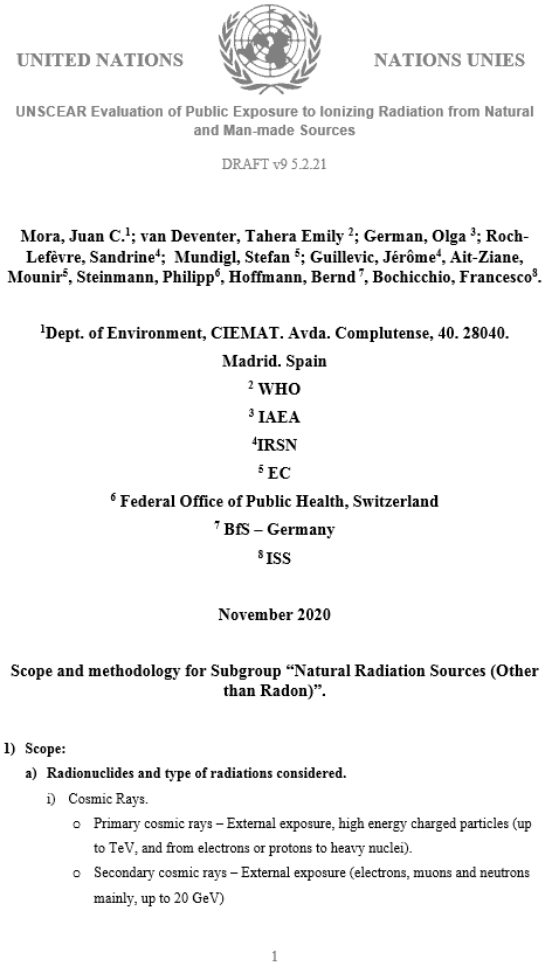
Scope and Methodology



UNITED NATIONS NATIONS UNIES

UNSCEAR Evaluation of Public Exposure to Ionizing Radiation from Natural and Man-made Sources

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[8] ISS

November 2020

Scope and methodology for Subgroup "Natural Radiation Sources (Other than Radon)".

1) **Scope:**
   a) **Radionuclides and type of radiations considered.**
      i) Cosmic Rays.
         - Primary cosmic rays – External exposure, high energy charged particles (up to TeV, and from electrons or protons to heavy nuclei).
         - Secondary cosmic rays – External exposure (electrons, muons and neutrons mainly, up to 20 GeV)

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SCOPE SG2

- Natural Background:
  - Cosmic Rays
  - Cosmogenic Radionuclides
  - Primordial Radionuclides
- HBRA
- NORM

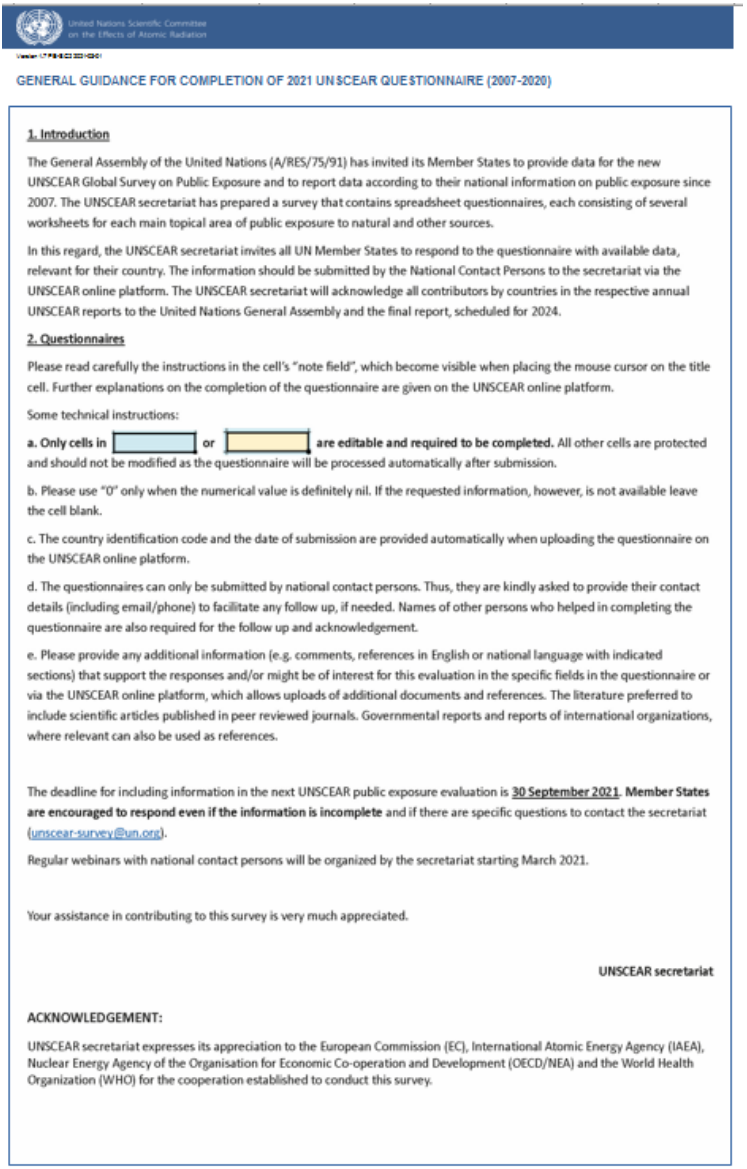
METHODOLOGY

- UNSCEAR 1982
- UNSCEAR 2000
- UNSCEAR 2008
- UNSCEAR 2016

DATA COMPILATION

- LITERATURE REVIEW (SCIENTIFIC LITERATURE)
- SURVEY FROM NCPS (NATIONAL DATA)

OBTAINING DATA FROM NCPs



United Nations Scientific Committee on the Effects of Atomic Radiation

GENERAL GUIDANCE FOR COMPLETION OF 2021 UNSCEAR QUESTIONNAIRE (2007-2020)

1. Introduction

The General Assembly of the United Nations (A/RES/75/91) has invited its Member States to provide data for the new UNSCEAR Global Survey on Public Exposure and to report data according to their national information on public exposure since 2007. The UNSCEAR secretariat has prepared a survey that contains spreadsheet questionnaires, each consisting of several worksheets for each main topical area of public exposure to natural and other sources.

In this regard, the UNSCEAR secretariat invites all UN Member States to respond to the questionnaire with available data, relevant for their country. The information should be submitted by the National Contact Persons to the secretariat via the UNSCEAR online platform. The UNSCEAR secretariat will acknowledge all contributors by countries in the respective annual UNSCEAR reports to the United Nations General Assembly and the final report, scheduled for 2024.

2. Questionnaires

Please read carefully the instructions in the cell's "note field", which become visible when placing the mouse cursor on the title cell. Further explanations on the completion of the questionnaire are given on the UNSCEAR online platform.

Some technical instructions:

a. Only cells in [ ] **or** [ ] **are editable and required to be completed.** All other cells are protected and should not be modified as the questionnaire will be processed automatically after submission.

b. Please use "0" only when the numerical value is definitely nil. If the requested information, however, is not available leave the cell blank.

c. The country identification code and the date of submission are provided automatically when uploading the questionnaire on the UNSCEAR online platform.

d. The questionnaires can only be submitted by national contact persons. Thus, they are kindly asked to provide their contact details (including email/phone) to facilitate any follow up, if needed. Names of other persons who helped in completing the questionnaire are also required for the follow up and acknowledgement.

e. Please provide any additional information (e.g. comments, references in English or national language with indicated sections) that support the responses and/or might be of interest for this evaluation in the specific fields in the questionnaire or via the UNSCEAR online platform, which allows uploads of additional documents and references. The literature preferred to include scientific articles published in peer reviewed journals. Governmental reports and reports of international organizations, where relevant can also be used as references.

The deadline for including information in the next UNSCEAR public exposure evaluation is 30 September 2021. **Member States are encouraged to respond even if the information is incomplete** and if there are specific questions to contact the secretariat (unscear-survey@un.org).

Regular webinars with national contact persons will be organized by the secretariat starting March 2021.

Your assistance in contributing to this survey is very much appreciated.

UNSCEAR secretariat

ACKNOWLEDGEMENT:

UNSCEAR secretariat expresses its appreciation to the European Commission (EC), International Atomic Energy Agency (IAEA), Nuclear Energy Agency of the Organisation for Economic Co-operation and Development (OECD/NEA) and the World Health Organization (WHO) for the cooperation established to conduct this survey.

Not all the cells and spreadsheets are required to be completed.

All the data requested is divided into

- Essential data and
- Supplementary data

Essential data is the minimum information needed to perform the dose assessments.

Supplementary data would provide information which would be used to produce more realistic assessments.

Information on parameters, uncertanties, etc. are included

GENERAL INFORMATION

United Nations Scientific Committee on the Effects of Atomic Radiation

Version 1.7 PE-SG2 2021-03-01	Please read the further instructions given as comments. They become visible when moving the mouse cursor on the cells. Do not modify the structure of this spreadsheet, as it will be processed automatically.

General information

Country information	
Country code	0
Date of submission	generated on upload
Years (period, from [year] to [year])*	
Population [inhabitants]* (local, national or regional)	
Population (survey base)*	

* required fields

The data submitted should be signed off and submitted by the national contact person, registered online via the UNSCEAR survey platform, including name, institution and contact details (email/phone) to facilitate any feedback.

Please, indicate contact details of any other person who might provide further information or feedback, if needed, and who should be acknowledged in the final report.

Contact information of NCP	
Name*	
Institution*	
Function*	
Email*	
Phone*	

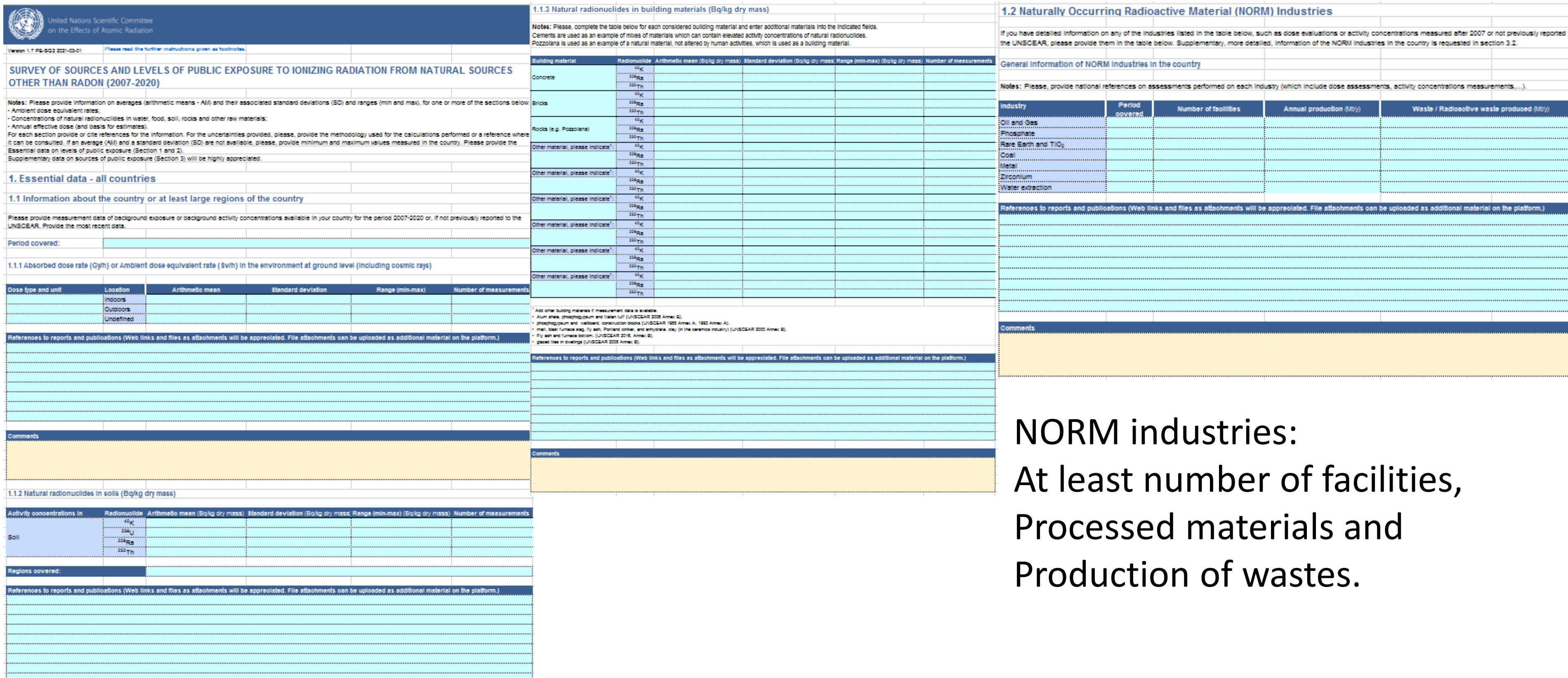
Supporting national experts	
Name	
Institution	
Function	
Email	
Phone	
Name	
Institution	
Function	
Email	
Phone	
Name	
Institution	
Function	
Email	
Phone	

Comments

General information regarding the NCP sending the survey.

SURVEY –SG2

ESSENTIAL DATA



NORM industries:

At least number of facilities,

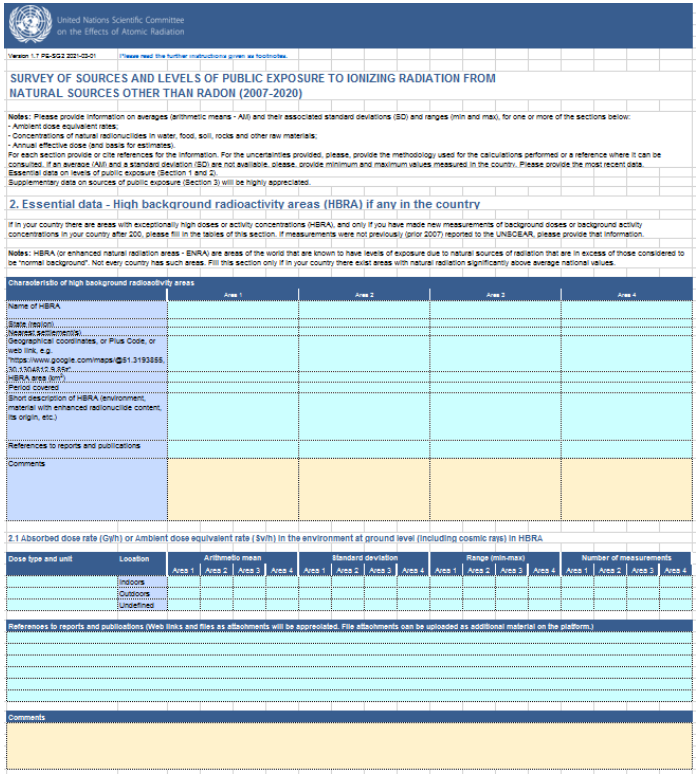
Processed materials and

Production of wastes.

Natural background and Building materials:

Country level (or at least big regions), based in actual measurements.

ESSENTIAL DATA - HBRA



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SURVEY OF SOURCES AND LEVELS OF PUBLIC EXPOSURE TO IONIZING RADIATION FROM NATURAL SOURCES OTHER THAN RADON (2007-2020)

2. Essential data - High background radioactivity areas (HBRA) if any in the country

Characterisation of high background radioactivity areas

	Area 1	Area 2	Area 3	Area 4
Name of HBRA				
State (region, province/territory)				
Nearest settlement(s)				
Geographical coordinates, or Plus Code, or web link, e.g. "https://www.google.com/maps/@51.3193885,30.1304817,9.88z"				
HBRA area (km²)				
Period covered				
Short description of HBRA (environment, material with enhanced radionuclide content, its origin, etc.)				
References to reports and publications				
Comments				

2.1 Absorbed dose rate (Gy/h) or Ambient dose equivalent rate (Sv/h) in the environment at ground level (including cosmic rays) in HBRA

Dose type and unit	Location	Arithmetic mean				Standard deviation				Range (min-max)				Number of measurements			
		Area 1	Area 2	Area 3	Area 4	Area 1	Area 2	Area 3	Area 4	Area 1	Area 2	Area 3	Area 4	Area 1	Area 2	Area 3	Area 4
	Indoors																
	Outdoors																
	Undefined																

References to reports and publications (Web links and files as attachments will be appreciated. File attachments can be uploaded as additional material on the platform.)

Comments

2.2 Natural radionuclides in soils (Bq/kg dry mass) in HBRA

Activity concentration	Radionuclide	Arithmetic mean (Bq/kg dry mass)				Standard deviation (Bq/kg dry mass)				Range (min-max) (Bq/kg dry mass)				Number of measurements			
		Area 1	Area 2	Area 3	Area 4	Area 1	Area 2	Area 3	Area 4	Area 1	Area 2	Area 3	Area 4	Area 1	Area 2	Area 3	Area 4
Soil	^{40}K																
	^{226}Ra																
	^{232}Th																

References to reports and publications (Web links and files as attachments will be appreciated. File attachments can be uploaded as additional material on the platform.)

Comments

2.3 Natural radionuclides in building materials (Bq/kg dry mass) in HBRA

Notes: Please, complete the table below for each considered building material and enter additional materials into the indicated fields.
Cements are used as an example of mixes of materials which can contain elevated activity concentrations of natural radionuclides.
Pozzolana is used as an example of a natural material, not altered by human activities, which is used as a building material.

Building material	Radionuclide	Arithmetic mean (Bq/kg dry mass)				Standard deviation (Bq/kg dry mass)				Range (min-max) (Bq/kg dry mass)				Number of measurements			
		Area 1	Area 2	Area 3	Area 4	Area 1	Area 2	Area 3	Area 4	Area 1	Area 2	Area 3	Area 4	Area 1	Area 2	Area 3	Area 4
Concrete	^{40}K																
	^{226}Ra																
	^{232}Th																
Bricks	^{40}K																
	^{226}Ra																
	^{232}Th																
Rocks (e.g. Pozzolana)	^{40}K																
	^{226}Ra																
	^{232}Th																
Other material, please (write here)	^{40}K																
	^{226}Ra																
	^{232}Th																
Other material, please (write here)	^{40}K																
	^{226}Ra																
	^{232}Th																
Other material, please (write here)	^{40}K																
	^{226}Ra																
	^{232}Th																

Add other building materials if measurement data is available.
- Alum shale, phosphogypsum and Italian tuff (UNSCEAR 2008 Annex B).
- phosphogypsum and wallboard, construction blocks (UNSCEAR 1988 Annex A; 1982 Annex A).
- marl, blast furnace slag, fly ash, Portland clinker, and anhydrite, clay (in the ceramics industry) (UNSCEAR 2000 Annex B).
- Fly ash and furnace bottom. (UNSCEAR 2016, Annex B).
- gravel tiles in drawings (UNSCEAR 2008 Annex B).

References to reports and publications (Web links and files as attachments will be appreciated. File attachments can be uploaded as additional material on the platform.)

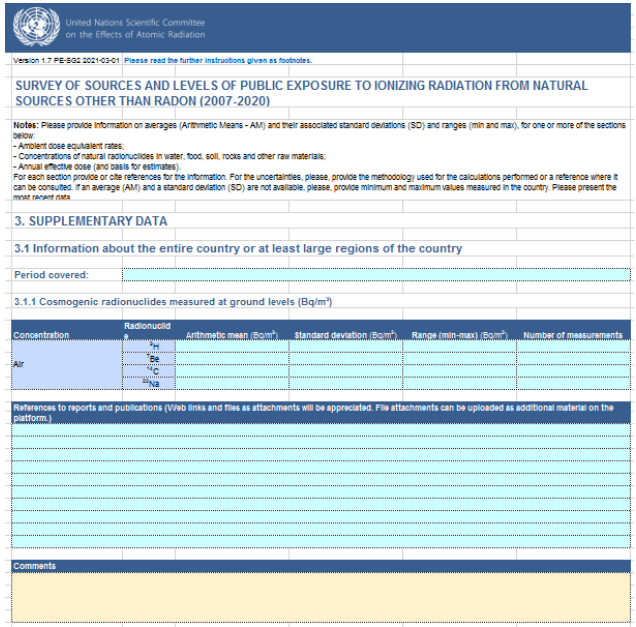
Comments

Identification of the HBRA and

Actual measurements on the HBRA (absorbed dose, activity concentrations,…),

- Provide a range and the uncertainties (SD).
- Provide references where possible.

SUPPLEMENTARY DATA



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Version 1.7 PE-SSG 2021-03-01 Please read the further instructions given as footnotes.

SURVEY OF SOURCES AND LEVELS OF PUBLIC EXPOSURE TO IONIZING RADIATION FROM NATURAL SOURCES OTHER THAN RADON (2007-2020)

Notes: Please provide information on averages (Arithmetic Means - AM) and their associated standard deviations (SD) and ranges (min and max), for one or more of the sections below:
- Ambient dose equivalent rates;
- Concentrations of natural radionuclides in water, food, soil, rocks and other raw materials;
- Annual effective dose (and basis for estimates).

For each section provide or cite references for the information. For the uncertainties, please, provide the methodology used for the calculations performed or a reference where it can be consulted. If an average (AM) and a standard deviation (SD) are not available, please, provide minimum and maximum values measured in the country. Please present the most recent data.

3. SUPPLEMENTARY DATA

3.1 Information about the entire country or at least large regions of the country

Period covered:

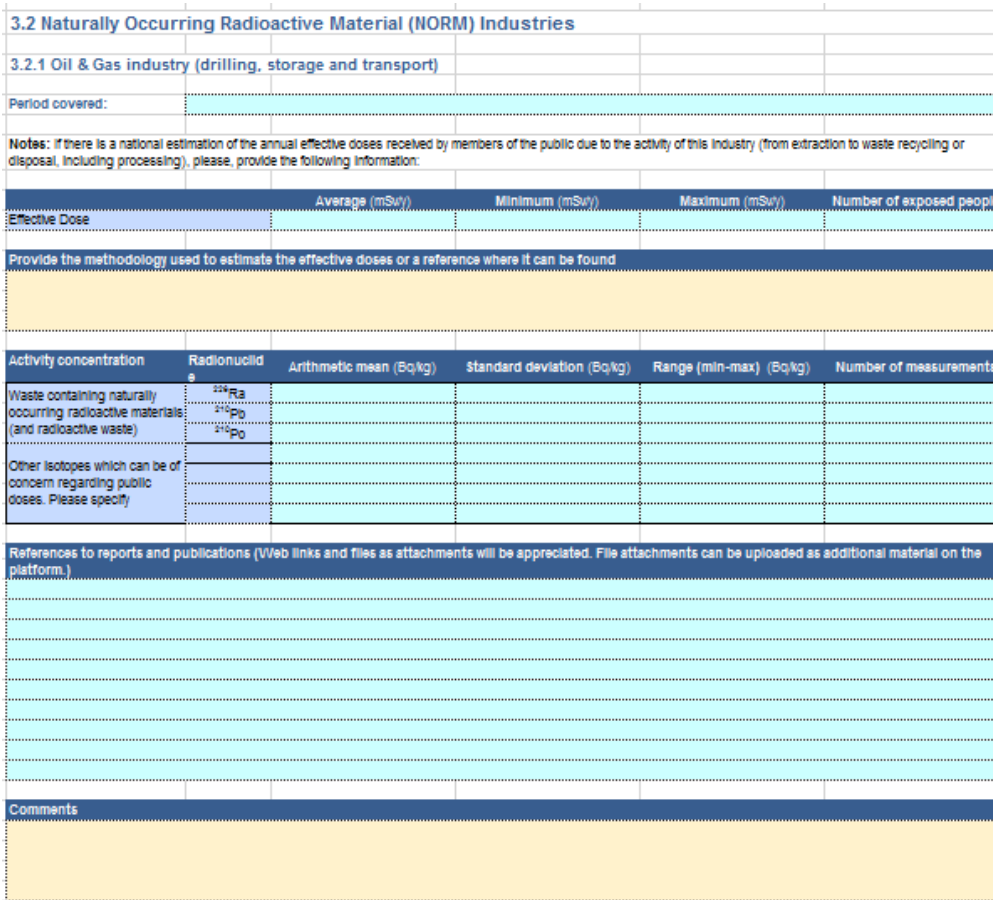
3.1.1 Cosmogenic radionuclides measured at ground levels (Bq/m³)

Concentration	Radionuclide	Arithmetic mean (Bq/m³)	Standard deviation (Bq/m³)	Range (min-max) (Bq/m³)	Number of measurements
Air	^{3}H				
	^{7}Be				
	^{14}C				
	^{22}Na				

References to reports and publications (Web links and files as attachments will be appreciated. File attachments can be uploaded as additional material on the platform.)

Comments

Additional information on cosmogenic radionuclides measured at ground level (mean, SD and range) – if available at country level.



3.2 Naturally Occurring Radioactive Material (NORM) Industries

3.2.1 Oil & Gas industry (drilling, storage and transport)

Period covered:

Notes: If there is a national estimation of the annual effective doses received by members of the public due to the activity of this industry (from extraction to waste recycling or disposal, including processing), please, provide the following information:

	Average (mSv/y)	Minimum (mSv/y)	Maximum (mSv/y)	Number of exposed people
Effective Dose				

Provide the methodology used to estimate the effective doses or a reference where it can be found

Activity concentration	Radionuclide	Arithmetic mean (Bq/kg)	Standard deviation (Bq/kg)	Range (min-max) (Bq/kg)	Number of measurements
Waste containing naturally occurring radioactive materials (and radioactive waste)	^{226}Ra				
	^{210}Pb				
	^{210}Po				
Other isotopes which can be of concern regarding public doses. Please specify					

References to reports and publications (Web links and files as attachments will be appreciated. File attachments can be uploaded as additional material on the platform.)

Comments

Additional information per NORM industry.

- Effective dose – assessed at country level – provide methodology and parameters.
- Activity concentrations – main radionuclides.
- References (not scientific articles, but national reports).