UNSCEAR PROJECT ON PUBLIC EXPOSURE

APPLICATIONS OTHER THAN NUCLEAR POWER

GLOBAL SURVEY

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SCOPE

- Sources and levels of public exposure in medical applications (human and veterinary medicine)
  - nuclear medicine, radiation therapy, interventional radiology (fluoroscopy), diagnostic radiology, wearable medical devices, insertable (invasive) medical devices, dental products
- Sources and levels of public exposure due to applications in industry, agriculture and research, including consumer products (production, use and disposal):
  - Sources in industry, agriculture and research
    - Non-destructive testing and ensuring product quality (industrial fixed gauges, portable moisture and density gauges, industrial radiography cameras)
    - Enhancing material quality
    - Radioactive material in chemical industry as catalyst
    - Electrostatic control
    - Radioactive tracers in industry and research
    - Well logging devices, for example for oil and gas exploration
    - Agricultural applications (water use and soil management, pest control, plant and animal productivity, food safety)
    - Radioisotope Thermoelectric Generators (RTG)
    - Security screening and non-medical body imaging (e.g. for legal purposes)
    - Other applications
  - Consumer products
    - Ionization chamber smoke detectors (ICSD)
    - Radioluminous products
    - High intensity discharge lamps
    - Fluorescent lamps starters
    - Electronic devices (voltage regulators, current surge protectors, spark gap irradiators and indicator lights)
    - Anti-static devices
    - Lightning preventors
    - Thoriated incandescent gas mantles, lenses and tungsten welding electrodes
    - Glassware, tableware, jewellery and ceramic tiles incorporating uranium
    - Irradiated gemstones and other items
    - Antique products
- Sources and levels of public exposure due to research reactors and other large licensed facilities, such as accelerators

ESSENTIAL DATA: LEVELS OF PUBLIC EXPOSURE (1)

1. ESSENTIAL DATA: LEVELS OF PUBLIC EXPOSURE

1.1 Public exposure due to industrial, research and domestic applications of radioactive material and radiation generators in areas other than nuclear power sector and medicine

(E.g.: Members of the public exposed by authorised facilities, activities and sources, or exposed by exempted from regulatory control practices and sources; Members of the public exposed by radioactive consumer products)

Category of practice, facility or source	Estimated number of facilities or sources	Pathway of exposure	Type of exposed group of members of the public	Source- or pathway-specific estimates of annual effective dose to members of the public[1]	Estimated number of exposed members of the public in the country from all facilities of indicated type	Estimated annual collective effective dose from all facilities of indicated type	Estimated maximum tissue absorbed dose due to recorded accidental exposure of members of the public[2]
	[number]			[mSv]	[number]	[man-Sv]	[Gy]
(E.g.: Factory that produce high intensity discharge lamps with Th-232; OR Lightning preventors with Am-241 installed at end-users' facilities; OR Radioisotope Thermoelectric Generators with Sr-90 installed at end-users' facilities; OR Exempted from the regulatory control gaseous tritium light sources installed at end-users' facilities; OR Rapiscan Secure 1000 X-ray backscatter AIT in country's airports; OR Generic security X-ray body screening system; OR X-ray industrial imaging system);		(E.g.: Atmospheric (discharges); OR Communal sewer system (liquid discharges); OR External exposure; OR All pathways)	(E.g.: General public; OR Workers of communal sewer facility; OR Staff members and other individuals who are not categorised as occupationally exposed)	(E.g.: Actual data is 0.03 mSv per annum per consumer product; OR Actual data N/A, dose constraint is 0.1 mSv per annum of exposure per authorised source OR effective dose is about 25 nSv per screening; OR compliance with ANSI/HPS N43.17-2009 standard: reference effective dose 0.25 μSv per screening and 250 μSv/a)	(E.g.: Less than 30 000 individuals exposed above 10 μSv/y of the effective dose) OR 48 million passengers per annum screened in country's airports)	(E.g.: The collective effective dose of individuals exposed above 10 μSv/a is less than 1 man-Sv)	(E.g.: Maximum absorbed dose of 0.8 Gy to the whole body due to accidental exposure of sixteen members of the public from the Cs-137 industrial sealed source melted with metal scrap)

ESSENTIAL DATA: LEVELS OF PUBLIC EXPOSURE (2)

1.2 Public exposure due to medical applications, including veterinary medicine (does not include direct exposure, e.g. receiving an x-ray)

1.2.1 Doses to members of the public due discharged or disposed radioactive substances and due to external exposure from radiation generators

Category of facility	Estimated number of facilities	Pathway of exposure	Type of exposed group of members of the public	Source- or pathway-specific estimates of annual effective dose to members of the public[1]	Estimated number of exposed members of the public in the country from all facilities of indicated type	Estimated annual collective effective dose from all facilities of indicated type	Estimated maximum tissue absorbed dose due to recorded exposure of members of the public[2]
	[number]			[mSv]	[number]	[man-Sv]	[Gy]
(E.g.: Radioisotope production facility; OR Medical facilities that use radioisotopes; OR Radiotherapeutic facilities)		(E.g.: Atmospheric (discharges); OR Communal sewer system (liquid discharges); OR Inhalation and direct exposure within a medical facility; OR External exposure)	(E.g.: General public; OR Workers of communal sewer facility; OR Staff members and other individuals who are not categorised as occupationally exposed; OR Members of the public and patients in adjacent rooms)	(E.g.: Estimated effective dose is 0.08 mSv per annum to the most exposed individual from atmospheric discharges; Authorised discharge is 0.01 GBq of I-131 per month per facility)	(E.g.: 8000 exposed above 10 µSv/a)	(E.g.: the collective effective dose of individuals exposed above 10 µSv/a is less than 1 man-Sv)	

1.2.2 Doses to members of the public due to radioactive substances or implanted devices in the body of patients or deceased persons

There are just examples in the categories. Please feel free to provide your own categories.

Category an exposed group of members of the public	Estimates of effective dose to members of the public[1]	Estimated number of exposed members of the public in the country	Estimated annual collective effective dose
	[mSv]	[number]	[man-Sv]
(E.g.: Members of the public other than family members, close friends, comforters or carers and exposed due to radionuclides in a patients body or excreta[2]; OR Family and close friends)	(E.g.: Actual data N/A, constraint is 0.3 mSv to the most exposed individual per episode; OR Actual data N/A, effective dose constraint is 1 mSv to the unborn child per annum)	(E.g.: Less than 7 000 individuals exposed above 10 µSv/a)	(E.g.: An estimate of collective effective dose to individuals exposed above 10 µSv/a is N/A)

SUPPLIMENTARY DATA: INVENTORIES OF RADOACTIVE MATERIAL AND SOURSES OF PUBLIC EXPOSURE

2. SUPPLEMENTARY DATA: INVENTORY OF RADIOACTIVE MATERIAL AND SOURCES OF PUBLIC EXPOSURE

2.1 Public exposure due to industrial, research and domestic applications in areas other than nuclear power sector and medicine

2.1.1 Inventory of radioactive material in industrial, research and domestic applications

Radioactive material and type of application	Year or period [year-year]	Number of sources in use (per annum) / total activity [pcs/GBq]	Annual production (number of sources) / total activity [pcs/GBq]	Annual import (number of sources) / total activity [pcs/GBq]	Annual export (number of sources) / total activity [pcs/GBq]
(E.g.: Am-241 smoke detectors (indicate pcs of detectors if data on their activity are unavailable); OR tritium-labelled compounds)					

2.1.2 Inventory of licenced large installations: research and other non-power reactors, particle accelerators, other large installations

Name of a facility or installation, type, key characteristics and location	Period of operation [year-year]	Period of decommissioning [year-year]	Annual discharges[1,2] [GBq]	Facility- or pathway-specific estimates of annual public exposure[1] [mSv]	Estimated number of exposed members of the public [number of individuals]	Estimated annual collective effective dose [man-Sv]
(E.g.: VR-1, Training zero power pool-type light water reactor, usual power 1 kW, Technical University in city X)						

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(E.g.: VR-1, Training zero power pool-type light water reactor, usual power 1 kW, Technical University in city X)						

2.2 Public exposure due to radioactive material in medical applications, including veterinary medicine

2.2.1 Inventory of radioactive substances for medical applications, including invasive medical devices

Radiopharmaceutical or other radioactive material	Year or period [year-year]	Annual production (total activity) [GBq]	Annual import (total activity) [GBq]	Annual export (total activity) [GBq]
(E.g.: I-125-fibrinogen; I-131-iodide; Ir-192 brachytherapy				

2.2.2 Inventory of sealed sources in non-invasive medical devices

Radionuclide	Year or period [year-year]	In use (per annum): total activity [number of sources/GBq]	Annual production: total activity [number of sources/GBq]	Annual import: total activity [number of sources/GBq]	Annual export: total activity [number of sources/GBq]
(E.g.: Co-60 source in therapeutic devices)	(E.g.:2007-2020)	(E.g.: 12000 GBq / 15 pcs)	(E.g.: average annual data for 2007-2020)	(E.g.: average annual data for 2007-2020)	(E.g.: average annual data for 2007-2020)