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| **ANNEX B**  **IAEA QUESTIONNAIRE ON OCCUPATIONAL EXPOSURES TO NORM**  **IN THE WATER SUPPLY AND TREATMENT INDUSTRY**  **FOR OPERATORS** | |
| **General Facility Information** | |
| Name of the Facility: |  |
| Street address: |  |
| Post address: |  |
| City/Town: |  |
| Postal code: |  |
| County/State: |  |
| Country: |  |
| Telephone: |  |
| Fax: |  |
| E-mail address: |  |
| **Contact Point Information** | |
| Name and Surname: |  |
| Title: |  |
| Job title or position: |  |
| Telephone: |  |
| Fax: |  |
| E-mail address: |  |
|  |  |
| I agree to include the data from the questionnaire to the IAEA Survey\* | e-signature/signature |
| \*All information will be treated as strictly confidential by the IAEA. Only anonymized and aggregated data will be made available. | |

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| General Site Information  (please insert *🗸* where appropriate) | | | |
| *Geographic location* | Latitude = | Longitude = | |
| *Geological location* | Granoids  Sedimentary host rock  Volcanics  Metamorphic rocks  Other  If combination/other  Unknown | | |
| *Mineralogical composition of the rock* | Uranium ores (U-238)  Monazite (Th-232)  Pyrochlore (Th-232)  Zircon (U-238)  Ilmenite (Th-232)  Rutile (U-238)  Phosphate (U-238)  Bauxite  Other metal ores (U-238 or Th-232)  If combination/other  Unknown | | |
| *Type of water treated* | Surface water  Ground water  Spring water | | |
| *Please indicate below the most recent available data (values with units)* ↓ | | | |
| Chemical composition of the water treated/handled (type and content of radionuclides | Ra-226 |  | |
| Ra-228 |  | |
| Gross alpha |  | |
| Uranium |  | |
| Beta/photon |  | |
| Other |  | |
| Radon |  | |
| Unknown |  | |
| *Surface water chemistry* | pH = | Redox potential [mV] = | |
| *Ground water chemistry* | pH = | Redox potential [mV] = | |
| *The age of ground water* |  | Unknown | |
| *Spring water chemistry* | pH = | Redox potential [mV] = | |
| *The age of spring water* |  | Unknown | |
| *Water withdrawal rates* |  | [m3/year] | |
| *The volume of water supplied* |  | [m3/day] | |
| General Information about Water Treatment Method  (please insert *🗸* where appropriate) | | | |
| *Water treatment method used* | Chemical treatment  Physical treatment  Biological treatment  If Combination/other | | |
| *Type of chemical treatment methods used* | An activated carbon filters  Cation or anion exchange (water softening)  Chlorination  Ozonation  An oxidizing filter (greensand filter or zeolite filter)  Neutralization  Flocculation  If Combination/other | | |
| *Type of physical treatment methods used* | Screening  Sedimentation  Skimming  Aeration  Mechanical filtration  Distillation  Reverse osmosis  Ultraviolet radiation  If Combination/other | | |
| *Type of biological treatment methods used* | Aerobic process  Anaerobic process  Composting  If Combination/other | | |
| *Type of residues/wastes produced by treatment* | Liquid  Solid  If Combination/other | | |
| *Type of solid residues/wastes* | Spent resins  Spent filter media  Spent membranes  Sludges  Filter socks  If Combination/other | | |
| *Type of liquid residues/waste* | Brine  Backwash  Rinse water  Acid neutralization water  Concentrate  Effluent  If Combination/other | | |
| *Please indicate below the most recent available data (values with units)* ↓ | | | |
| *Amount of residues/wastes produced per unit volume of water processed* | Spent resins | |  |
| Spent filter media | |  |
| Spent membranes | |  |
| Filter Socks if not same as spent membranes | |  |
| Sludges | |  |
| Brine | |  |
| Backwash | |  |
| Rinse water | |  |
| Acid neutralization water | |  |
| Concentrate | |  |
| Effluent | |  |
| If Combination/other | |  |
| *Please indicate below the most recent available data (values with units)* ↓ | | | |
| *Activity concentration of radionuclides in produced residues/wastes* | Spent resins | |  |
| Spent filter media | |  |
| Spent membranes | |  |
| Filter Socks if not same as spent membranes | |  |
| Sludges | |  |
| Brine | |  |
| Backwash | |  |
| Rinse water | |  |
| Acid neutralization water | |  |
| Concentrate | |  |
| Effluent | |  |
| If Combination/other | |  |
| *Disposal options* | Direct discharges  Recycle  Underground injection  Landfill  Incineration  Evaporation ponds  Surface impoundments  Sludge dewatering  Land spreading  Soil mixing and disposal  Soil mixing and recycling  If Combination/other | | |
| *Recycling of residues* | in the cement and brick industry  in the manufacturing of plant granulate  in road construction  as a precipitant in wastewater works  in agriculture and forestry  if combination/other  No recycle | | |
| General Information about Occupational Exposure  (please insert *🗸* where appropriate) | | | |
| *Categorization of workers/Classified workers* | Yes  No | | |
| *What is the criterion for categorization or classification of workers?* |  | | |
| *Please indicate the most recent available data on number of workers categorized/classified according to above mentioned criterion* |  |  | |
| *Itinerant workers not already included in above* | Yes  No | | |
| *What is the criterion for categorization or classification of itinerant workers?* |  | | |
| *Please indicate the most recent available data on number of itinerant workers categorized/classified according to above mentioned criterion* |  |  | |
| *Number of non-classified workers* |  | | |
| *Staff total* |  | | |
| *Classified areas* | Yes  No | | |
| *Exposure pathways* | **External exposure**  *(exposure to gamma radiation)*  **Inhalation**  *(inhalation of radon progeny, inhalation of aerosols containing long lived alpha or beta activity from dust during ash or sludge handling operations, maintenance operations)*  **Ingestion**  *(workers could ingest radioactive materials if they fail to observe good sanitary practices, such as washing their hands before eating after handling sewage sludge or ash, etc.)* | | |
| *Protective measures taken to minimize exposure to gamma radiation* | Control of the occupancy period  Shielding  Increasing the frequency of changing equipment that can concentrate radionuclides (to limit the activity concentration)  Discouraging and reducing access  Storing materials in mostly unoccupied areas  Physical barriers  Warning signs  If combination/other | | |
| *Protective measures taken to minimize exposure through inhalation* | Control of the air quality  Ventilation systems  Restrict or limit access by workers to any non-ventilated areas  Personal protective equipment (such as respirators)  Placing fixed workstations in return airways  The use of vacuum cleaning  General housekeeping, Spillage control  Personal hygiene  If combination/other | | |
| *Protective measures taken to minimize exposure through ingestion* | Personal hygiene  Monitoring land applied areas for radioactivity  Monitoring drinking water  If combination/other | | |
| *Monitoring practices* | Personal dosimetry  (individual dose measurements)  Monitoring of workplace  (dose rate, activity of aerosols, radon monitoring, area monitoring and estimates of occupancy times)  Monitoring in the vicinity of the workplace  (dose rate, activity of RNs in aerosols, activity of RNs in different types of environmental samples)  If combination/other | | |
| *Personal dosimetry methodology* | Selected individuals  Workgroup averaging  Area monitoring  All individuals  If combination/other | | |
| *Number of workers (mentioned above) monitored by dosimetry services (personal dosimetry)* | Categorized/Classified workers | | Itinerant workers |
|  | |  |
| *Type of personal dosimeters used* | TLDs  Integrated dosimeters  EPDs  OSLs  None  If combination/other | | |
| *Monitoring of workplaces* | Dose rate  Radon  Activity of aerosols  Occupancy time  None  If combination/other | | |
| *Assessment of doses* | Effective doses  Equivalent dose (skin)  Equivalent dose (extremities)  None | | |

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| *Dose histogram data* | | | | | | | | | | | | | | | |
|  | **Number of workers in dose range (total dose)**  **[mSv/y]** | | | | | | | | | | | | | | |
| Work group[[1]](#footnote-1) | < 0.5 | 0.5-1.0 | 1.0-1.5 | 1.5-2.0 | 2.0-2.5 | 2.5-3.0 | 3.0-3.5 | 3.5-4.0 | 4.0-4.5 | 4.5-5.0 | 5.0-5.5 | 5.5-6.0 | 6.0-6.5 | 6.5-7.0 | 7.0-7.5 |
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|  | Number of workers in dose range (total dose)  [mSv/y] | | | | | | | | | | | | |
| Work group | 7.5-8.0 | 8.0-8.5 | 8.5-9.0 | 9.0-9.5 | 9.5-10.0 | 10.0-10.5 | 10.5-11.0 | 11.0-11.5 | 11.5-12.0 | 12.5-13.0 | 13.0-13.5 | 13.5-14.0 | 14.0-14.5 |
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|  | Number of workers in dose range (total dose)  [mSv/y] | | | | | | | | | | | |
| Work group | 14.5-15.0 | 15.0-15.5 | 15.5-16.0 | 16.0-16.5 | 16.5-17.0 | 17.0-17.5 | 17.5-18.0 | 18.0-18.5 | 18.5-19.0 | 19.0-19.5 | 19.5-20.0 | > 20 |
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1. Please indicate the main activity performed by selected work groups [↑](#footnote-ref-1)