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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: |  |
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| 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)