

# CONVERSION AND-OR FUEL FABRICATION PLANTS



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International Atomic Energy Agency

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## INTERNATIONAL ATOMIC ENERGY AGENCY DEPARTMENT OF SAFEGUARDS

# DESIGN INFORMATION QUESTIONNAIRE \*

IAEA USE ONLY

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The purpose of this document is to obtain the facility design information required by the Agency in order to discharge its safeguards responsibilities. It will also serve as a checklist for examination of design information by Agency inspector(s). If, in any area, insufficient space is available add further sheets to the extent necessary.

| IAEA USE ONLY            |   |
|--------------------------|---|
| COUNTRY                  |   |
| COUNTRY OFFICER          |   |
| TYPE                     | Conversion and-or fuel fabrication plants |
| DATE OF INITIAL DATA     |   |
| VERIFICATION             |   |
| LAST REVIEW AND UPDATING |   |

## ALL FACILITIES

### GENERAL INFORMATION

|   |   |                                   |                               |
|---|---|-----------------------------------|-------------------------------|
| <b>1. Name of the facility</b><br>(include usual abbreviation)  |   |                                   |                               |
| <b>2. Location and postal address</b>   |   |                                   |                               |
| <b>3. Owner</b><br>(Legally responsible)  |   |                                   |                               |
| <b>4. Operator</b><br>(Legally responsible)   |   |                                   |                               |
| <b>5. Description</b><br>(Main features only)   |   |                                   |                               |
| <b>6. Purpose</b>   |   |                                   |                               |
| <b>7. Status</b><br>(e.g., planned; under construction, in operation; shut down; closed down; decommissioned)   |   |                                   |                               |
| <b>8. Construction schedule dates</b><br>(if not in operation)  | <b>Start of Construction (MM/DD/YYYY)</b>       | <b>Commissioning (MM/DD/YYYY)</b> | <b>Operation (MM/DD/YYYY)</b> |
|   |   |                                   |                               |
| <b>9. Normal operating mode</b><br>(days only, two shift, three shift; number of days/annum, etc.)  |   |                                   |                               |
| <b>10. Facility layout</b><br>(structural containment, fences, access, nuclear material storage areas, laboratories, waste disposal areas, routes followed by nuclear material, experimental and test areas, etc.)    | DRAWING(S) ATTACHED UNDER REF. NOS.             |                                   |                               |
| <b>11. Sitting of facility</b><br>(Maps showing in sufficient detail: location, premises and perimeter of facility, other buildings, roads, railways, rivers, etc.)   | DRAWING(S) AND/OR MAPS ATTACHED UNDER REF. NOS. |                                   |                               |
| <b>12. Names and/or titles and address of responsible officers</b><br>(for nuclear material accountancy and control and contact with the Agency. If possible attach organization charts showing position of officers) |   |                                   |                               |

### OVERALL PROCESS PARAMETERS

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|---|--|
| <p><b>13. Facility description</b><br/>(indicating important items of equipment which use, produce or process nuclear material, all process stages, storage areas and feed, product and waste points as pertaining to the measurement, control and accountancy of nuclear material)</p> | <p>GENERAL FLOW DIAGRAM(S) ATTACHED UNDER REF. NOs. (The diagram(s) should also indicate equipment, hoods, cells, and those areas which contain nuclear material as those specific areas where hold-up of nuclear material can occur.)</p> <div style="border: 1px solid black; height: 50px; width: 100%;"></div> |
| <p><b>14. Process description</b><br/>(indicating type of conversion, method of fabrication, sampling methods, etc., indicating also the modification of physical and chemical forms)</p>   |  |
| <p><b>15. Design capacity</b><br/>(In weight of principal products per annum)</p>   |  |
| <p><b>16. Anticipated annual throughput</b><br/>(in the form of a forward programme (if applicable), indicating the proportion of various feeds and products)</p>   |  |
| <p><b>17. Other important items of equipment using, producing or processing nuclear material</b><br/>(such as testing and experimental equipment)</p>   |  |

### NUCLEAR MATERIAL DESCRIPTION AND FLOW

| 18. Main material description   | Feed | Intermediate product<br>(powder, pellets, etc. separately stored or shipped) | Product |
|---|------|--|---------|
| i) Main types of accountability units to be handled in the facility   |      |  |         |
| ii) Chemical and physical form (for product include types of fuel element/assemblies, give detailed description indicating general structure and overall structure and overall dimensions of fuel element/assemblies, including nuclear material content and enrichment). Attach drawing(s) |      |  |         |
| iii) Throughput, enrichment ranges and Pu contents (for normal flowsheet operation indicating if blending and/or recycling takes place)   |      |  |         |
| iv) Batch size/flow rate and campaign period, means of batch identification   |      |  |         |
| v) Storage and plant inventory (indicating any change with throughput)  |      |  |         |
| vi) Frequency of receipt or shipment (batches/units per month)  |      |  |         |

## NUCLEAR MATERIAL DESCRIPTION AND FLOW

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| <b>19. Scrap material</b>  |  |
| <b>20. Waste material</b><br>(including contaminated equipment, measured discards and retained waste)<br>Describe for each waste stream:<br>i) Major contributions (sources) |  |
| ii) Types of waste   |  |
| iii) Chemical and physical form<br>(liquid, solid, etc.)   |  |
| iv) Estimated enrichment ranges and uranium/plutonium content  |  |
| v) Estimated quantities per year, period of storing  |  |
| vi) Waste generated rates (as % of input/ throughput, quantities per month)  |  |
| vii) Store inventory range and maximum capacity  |  |
| viii) Method and frequency of recovery/disposal  |  |
| <b>21. Waste treatment system</b>  | <p>DIAGRAM(S) ATTACHED UNDER FIG. NOs.</p> |
| <b>22. Other nuclear material in the facility and it's location, if any</b>  | <p>DIAGRAM(S) ATTACHED UNDER REF. NOs.</p> |
| <b>23. Schematic flowsheet for nuclear material</b><br>(identifying sampling points, flow and inventory measurement points, accountability areas, inventory locations, etc.) | <p>DIAGRAM(S) ATTACHED UNDER REF. NOs.</p> |



**NUCLEAR MATERIAL DESCRIPTION AND FLOW**

**24. Types, form, ranges of nuclear material content** (Including enrichment, as applicable), ranges of quantities of nuclear material flow for each nuclear material handling area, i. e.:

- process area
- storage area
- other locations

(Also indicate maximum quantities of nuclear material to be handled in accountability areas at the one time.)

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**25. Recycle processes** (briefly describe any such processes giving source and form of material, method of storage, normal inventory, frequency of processing, duration of temporary storage, schedules for any external recycling, measurement method of fissile content of recycle material)

DIAGRAM(S) ATTACHED UNDER REF. NOS.

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**26. Inventory** (within plant and equipment during normal operation; indicate quantity, range of enrichment, Pu content, form and principal locations and any significant change in time or throughput; indicate anticipated residual hold-up and mechanism, e.g. plate out, condensation)

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i) In-process

ii) Feed and product storages

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iii) Other locations (quantity, range of enrichment, Pu content, form and location of inventory not already specified)

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**NUCLEAR MATERIAL HANDLING (FOR EACH ACCOUNTABILITY AREA)**

**27. Containers, packaging and storage area description**

DRAWING(S) ATTACHED UNDER REF. NOS.

SEPARATE NOTE TO BE ATTACHED.

Describe for feeds, products and wastes: the type and size of storage and shipping containers and packaging used (including nominal capacity and capacity for normal operation, and type of material); method of storage or packing, filling and emptying procedures, shielding; and any special identification features.

**28. Methods and means of transfer of nuclear material** (describe also equipment used for handling of feed, product, waste)

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**29. Transportation routes followed by nuclear material** (with reference to plant layout)

DRAWING(S) ATTACHED UNDER REF. NOS.

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**30. SHIELDING** (for storage, transfer and process area)

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**PLANT MAINTENANCE**

**31. Maintenance, decontamination, clean-out**

SEPARATE NOTE TO BE ATTACHED.

Describing plans and procedures for decontamination and clean-out of equipment containing nuclear material, defining all sampling and measurement points associated with:  
(In cases where clean-out and/or sampling is not possible, indicate how the hold-up of nuclear material is measured or calculated.)

i) Normal plant maintenance

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ii) Plant and equipment decontamination and subsequent nuclear material recovery

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iii) Plant and equipment clean-out including means of ensuring vessels are empty

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iv) Plant start-up and and plant shut-down (If different from normal operation)

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**PROTECTION AND SAFETY MEASURES**

**32. Basic measures for physical protection of nuclear material**

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**33. Specific health and safety rules for inspector compliance**  
(if extensive, attach separately)

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**NUCLEAR MATERIAL ACCOUNTANCY AND CONTROL**

**34. System description**

Give a description of the nuclear material accountancy system, the method of recording and reporting accountancy data and establishing material balances, frequency of material balances, procedures for account adjustment after plant inventory, mistakes, etc., under the following headings:

SPECIMEN FORMS USED IN ALL PROCEDURES ATTACHED UNDER REF. No.

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i) General  
(This section should also state what general and subsidiary ledgers will be used, their form (hard copies, tapes, microfilms, etc.) as well as who has the responsibility and authority. Source data (e.g. shipping and receiving forms, internal transfer documents, physical inventory forms, the initial recording of measurements and measurement control sheets) should be identified. The procedures for making adjustments, the source data and records should be covered as well as how the adjustments are authorized and substantiated.)

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ii) Receipts  
(including method of dealing with shipper/receiver differences and subsequent account corrections; the checks and measurements used to confirm nuclear material content and the persons responsible for those determinations should be defined)

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**NUCLEAR MATERIAL ACCOUNTANCY AND CONTROL**

iii) Shipments  
(products, waste, measured discards)

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iv) Physical inventory  
Description of procedures, scheduled frequency, estimated distribution of nuclear material, methods of operator's inventory taking (both for item and/or bulk accountancy, including relevant assay method), accessibility and possible verification method for nuclear material, expected accuracy, and access to nuclear material. (In particular the description of procedures should also provide the basic inventory approach to be used, i.e. planning, organizing, and conducting the inventory, prelisting, use of prior measurement data; who has the primary responsibility for the inventory; how process clean-out is accomplished; the accountancy of process residual hold-up.)

LIST OF MAJOR ITEMS OF EQUIPMENT REGARDED AS NUCLEAR MATERIAL CONTAINERS ATTACHED UNDER REF. NOS.

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v) Measured discards  
(method of estimation of quantities per year/month, method of disposal)

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vi) Retained waste  
(method of estimation of quantities per year, method and envisaged period of storage; indicate also possible subsequent uses of retained waste)

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vii) Unmeasured losses  
(indicate the methods used to estimate unmeasured losses)

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viii) Operational records and accounts  
(including logbooks, general ledgers, internal transfer forms, method of adjustment or correction and retention location, and languages; control measures and responsibility for records)

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**35. Features related to containment and surveillance measures**  
(general description of applied or possible measures in reference to floor plan or plant layout)

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**36. For each flow and inventory measurement point, and sampling points of accountability areas, identified in particular under Qs. 13, 23, 24, Give the following:**  
For each measurement point fill in separate sheet.  
Number of measurement points: 1

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i) Description of location, type, identification

ii) Expected types of inventory change at this measurement point

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## NUCLEAR MATERIAL ACCOUNTANCY AND CONTROL

iii) Possibilities to use this measurement point for physical inventory taking

iv) Physical and chemical form of nuclear material (including enrichment range, Pu content, and cladding materials description)

v) Nuclear material containers, packaging and method of storage

vi) Sampling procedure and equipment used (including number of samples taken, frequency and rejection criteria)

vii) Measurement/analytical method(s) and equipment used and corresponding accuracies

viii) Source and level of random and systematic errors for feed, product, scrap, waste (weight, volume, sampling, analytical)

ix) Calculative and error propagation techniques

x) Technique and frequency of calibration of equipment used, and standards used

xi) Programme for the continuing appraisal of the accuracy of weight, volume, sampling and analytical techniques and measurement methods

xii) Programme for statistical evaluation of data from (x) and (xi)

xiii) Method of converting source data to batch data (standard calculative procedures, constants and empirical relationships for feed, products in sub-accounting areas, waste and scrap)

xiv) Means of batch identification

xv) Anticipated batch flow rate per year





## NUCLEAR MATERIAL ACCOUNTANCY AND CONTROL

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| xvi) Anticipated number of inventory batches   |  |
| xvii) Anticipated number of items per flow and inventory batches   |  |
| xviii) Type, composition and quantity of nuclear material per batch (with indication of batch data, total weight of each element of nuclear material and form of nuclear material) |  |
| xix) Features related to containment-surveillance measures   |  |
| <b>37. Overall limit of error</b><br>Describe procedures to combine individual measurement error determination to obtain the overall limit of error for:                           |  |
| i) S/R differences   |  |
| ii) Book inventory   |  |
| iii) Physical inventory  |  |
| iv) MUF  |  |

## POST-OPERATION INFORMATION

|   |                                 |                             |
|---|---------------------------------|-----------------------------|
| <b>38. Decommissioning schedule dates</b>                 | End of operations (MM/DD/YYYY)  | Decommissioned (MM/DD/YYYY) |
|   |                                 |                             |
| <b>39. Facility decommissioning plan</b>                  | PLAN(s) ATTACHED UNDER REF. NOs |                             |
| i) Key events of the decommissioning plan                 |                                 |                             |
| ii) Removal and recovery of nuclear material              |                                 |                             |
| iii) Removing or rendering inoperable essential equipment |                                 |                             |

## OPTIONAL INFORMATION

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| <b>40. Optional information</b><br>(that the operator considers relevant to safeguarding the facility) |  |
| <b>Signature of Responsible Officer</b>  |  |
| <b>Date (MM/DD/YYYY)</b>   |  |