

RESEARCH AND POWER REACTORS



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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 | Research and power reactors |
| DATE OF INITIAL DATA | |
| VERIFICATION | |
| LAST REVIEW AND UPDATING | |

ALL FACILITIES

GENERAL INFORMATION

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|---|---|-----------------------------------|-------------------------------|
| 1. Name of the facility (include usual abbreviation) | | | |
| 2. Location and postal address | | | |
| 3. Owner (Legally responsible) | | | |
| 4. Operator (Legally responsible) | | | |
| 5. Description (Main features only) | | | |
| 6. Purpose | | | |
| 7. Status (e.g., planned; under construction, in operation; shut down; closed down; decommissioned) | | | |
| 8. Construction schedule dates (if not in operation) | Start of Construction (MM/DD/YYYY) | Commissioning (MM/DD/YYYY) | Operation (MM/DD/YYYY) |
| 9. Normal operating mode (days only, two shift, three shift; number of days/annum, etc.) | | | |
| 10. Facility layout (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. | | |
| 11. Sitting of facility (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. | | |
| 12. Names and/or titles and address of responsible officers (for nuclear material accountancy and control and contact with the Agency. If possible attach organization charts showing position of officers) | | | |



GENERAL REACTOR DATA

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| 13. Facility description (indicating important items of equipment which use, produce or process nuclear material) | GENERAL FLOW DIAGRAM(S) ATTACHED UNDER REF. NOs. | |
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| 14. Rated thermal output, Electricity Output (for power reactors) | | |
| 15. Number of units (reactors) and their layout in the facility | | |
| 16. Reactor type | | |
| 17. Type of refueling (on or off load) | | |
| 18. Core enrichment range and Pu concentration (At equilibrium for on-load reactors, initial and final for off-load reactors) | | |
| 19. Moderator | | |
| 20. Coolant | | |
| 21. Blanket, reflector | | |

NUCLEAR MATERIAL DESCRIPTION

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| 22. Types of fresh fuel | | |
| 23. Fresh fuel enrichment (U-235) and/or Pu content (average enrichment per each type of assembly) | | |
| 24. Nominal weight of fuel in elements/assemblies (with design tolerances) | | |
| 25. Physical and chemical form of fresh fuel (General Description) | | |



NUCLEAR MATERIAL DESCRIPTION

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| <p>26. Reactor assemblies* (Indicate for each type)</p> <ul style="list-style-type: none"> • types of assemblies; • number of fuel assemblies, control and shim assemblies, experimental assemblies in the core, in blanket zone(s); • number and types of fuel rods/elements** • average enrichment and/or Pu content per assembly; • general structure; • geometric form; • dimensions; • cladding material <p>* Assembly is the combination of elements or handling units such as cluster or bundle. ** Element is the smallest contained fuel unit.</p> | <p>DRAWING(S) ATTACHED UNDER REF. NOS.</p> |
| <p>27. Description of fresh fuel elements</p> <ul style="list-style-type: none"> • physical and chemical form of fuel; • nuclear material and fissionable material and its quantity (with design tolerances); • enrichment and/or Pu content; • geometric form; • dimensions; • number of slugs/pellets per element; • composition of alloy; • cladding material (thickness, composition of material, bonding) | <p>DRAWING(S) ATTACHED UNDER REF. NOS.</p> |
| <p>28. Provision for element exchange in assemblies of each type (Indicate whether this is foreseen to become a routine operation)</p> | |
| <p>29. Basic operational accounting unit(s) (Fuel elements/assemblies, etc.)</p> | <p>DRAWING(S) ATTACHED UNDER REF. NOS.</p> |
| <p>30. Other types of units</p> | |
| <p>31. Means of nuclear material/fuel identification</p> | |
| <p>32. Other nuclear material in the facility (Each separately identified)</p> | |



NUCLEAR MATERIAL FLOW

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| <p>33. Schematic flow sheet for nuclear material the facility (Identifying measurement points, accountability areas, inventory locations, etc.)</p> | DRAWING(S) ATTACHED UNDER REF. NOs. | |
| <p>34. Inventory state quantity range, number of items, and approximate uranium enrichment and plutonium content for (Under normal operating conditions)</p> <p>i) Fresh Fuel Storage ii) Reactor Core iii) Spent Fuel Storage iv) Other Locations</p> | i) Fresh Fuel Storage | |
| | ii) Reactor Core | |
| | iii) Spent Fuel Storage | |
| | iv) Other Locations | |
| <p>35. Load factor (Power Reactor Only)</p> | | |
| <p>36. Reactor core loading (Number of Elements/Assemblies)</p> | | |
| <p>37. Refueling requirements (Quantity, Time Interval)</p> | | |
| <p>38. Burn-up (Average/maximum)</p> | | |
| <p>39. Is the irradiated fuel to be reprocessed or stored? (If stored, indicate site)</p> | | |

NUCLEAR MATERIAL HANDLING

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| 40. Fresh fuel | | |
| i) Packaging (description) | | |
| DRAWING(S) ATTACHED UNDER REF. NOs. | | |
| ii) Layout, general arrangements and storage plan | | |
| iii) Capacity of store | | |
| DRAWING(S) ATTACHED UNDER REF. NOs. | | |
| iv) Fuel preparation and assay room, and reactor loading area (description and indication of layout and general arrangement) | | |



NUCLEAR MATERIAL HANDLING

DRAWING(S) ATTACHED UNDER REF. NOs.

41. Fuel transfer equipment
(including refueling machines)

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42. Routes followed by nuclear material
(fresh fuel, irradiated fuel, blanket, other material)

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DRAWING(S) ATTACHED UNDER REF. NOs.

43. Reactor vessel
(showing core location, access to vessel, vessel openings, fuel handling in vessel)

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DRAWING(S) ATTACHED UNDER REF. NOs.

44. Reactor core diagram
(showing general disposition, lattice, form, pitch, dimensions of core, reflector, blanket; location, shapes and dimensions of fuel elements/assemblies; control elements/assemblies; experimental elements/assemblies)

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45. Number and size of channels for fuel elements or assemblies and for control elements in the core

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46. Average mean neutron flux in the core:

i) Thermal:

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ii) Fast:

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47. Instrumentation for measuring neutron and gamma flux

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48. Irradiated fuel

DRAWING(S) ATTACHED UNDER REF. NOs.

i) Layout, spent fuel storage plan and general arrangement (internal and external)

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ii) Method of storage

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NUCLEAR MATERIAL HANDLING

iii) Design capacity of storage

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iv) Minimum and normal cooling period prior to shipment

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DRAWING(S) ATTACHED UNDER REF. NOS.

v) Description of irradiated fuel transport equipment and shipping cask
(If no information on site, where is it held?)

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49. Maximum activity of fuel/blanket after refueling
(at the surface and at a distance of 1 meter)

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50. Methods and equipment for handling irradiated fuel
(except for that already given under Qs. 41, 48.v)

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51. Nuclear material testing areas
(except as already given under Q. 40)
For each such area briefly describe

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i) Nature of activities

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ii) Major equipment available
(e.g., hot cell, fuel element decladding and dissolution equipment)

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iii) Shipping containers Used
(main-material, scrap and waste)

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iv) Storage Areas for both unirradiated and irradiated materials

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DRAWING(S) ATTACHED UNDER REF. NOS.

v) Layout and general arrangement

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COOLANT DATA

52. Flow diagram
(indicating mass flow, temperature and pressure at major points, etc.)

DRAWING(S) ATTACHED UNDER REF. NOS.

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PROTECTION AND SAFETY MEASURES

53. Basic measures for physical protection of nuclear material

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

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NUCLEAR MATERIAL ACCOUNTANCY AND CONTROL

55. System description
Give a description of the nuclear material accounting system, of the method of recording and reporting accountancy data, the procedures for account adjustment after inventory, and correction of mistakes, etc., under the following headings:

SPECIMEN FORMS USED IN ALL PROCEDURES ATTACHED UNDER REF. NOS.

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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, 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

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iii) Shipments

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NUCLEAR MATERIAL ACCOUNTANCY AND CONTROL

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

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| <p>iv) Physical inventory description of procedures, scheduled frequency, methods of operator's inventory taking (both for item and/or mass accountancy), including relevant assay methods and expected accuracy, access to nuclear material, possible verification method for irradiated nuclear material, methods of verification of nuclear material in the core</p> | |
| <p>v) Nuclear loss and production (Estimation of elements)</p> | |
| <p>vi) Operational records and accounts (including method of adjustment or correction and place preservation and language)</p> | |
| <p>56. Features related to containment and surveillance measures (General description)</p> | |
| <p>57. For each measurement point of accountability areas, identified in particular under Qs. 13, 33, 34, Give the following (If applicable) For each measurement point fill in separate sheet. Number of measurement points: 1</p> | <p>IF NECESSARY, ATTACH DRAWING(S)</p> |
| <p>i) Description of location, Type, identification</p> | |
| <p>ii) Anticipated types of inventory change and possibility to use this measurement point for physical inventory taking</p> | |
| <p>iii) Physical and chemical form of nuclear material (with cladding materials description)</p> | |
| <p>iv) Nuclear material containers, packaging</p> | |



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NUCLEAR MATERIAL ACCOUNTANCY AND CONTROL

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| v) Sampling procedures and equipment used | |
| vi) Measurement method(s) and equipment used (item counting, neutron flux, power level, nuclear burn-up and production, etc.) | |
| vii) Source and level of accuracy | |
| viii) Technique and frequency of calibration of equipment used | |
| ix) Program for the counting appraisal of the accuracy of methods and techniques used | |
| x) Method of converting source data to batch data (standard calculative procedures, constants used, empirical relationships, etc.) | |
| xi) Anticipated batch flow for year | |
| xii) Anticipated number of items per flow and inventory batches | |
| xiii) Type, composition and quantity of nuclear material per batch (with indication of batch data, total weight of each element of nuclear material and, in the case of plutonium and uranium, the isotopic composition when appropriate; form of nuclear material) | |
| xiv) Access to nuclear material and its location | |
| xv) Features related to containment-surveillance measures | |

OPTIONAL INFORMATION

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| 58. Decommissioning schedule dates | <p align="center">End of operations (MM/DD/YYYY)</p> | <p align="center">Decommissioned (MM/DD/YYYY)</p> |
| 59. Facility decommissioning plan | 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 of essential equipment | | |
| Signature of Responsible Officer | | |
| Date (MM/DD/YYYY) | | |