

Overview

This NOS forms part of a suite of standards which cover the activities carried out by individuals working within and on behalf of nuclear site licensed companies to meet nuclear material accountancy, control and safeguard (**NMAS**) requirements.

What is the NOS about?

A nuclear licensed site must ensure that nuclear materials are accounted for, controlled and safeguarded in order to demonstrate; good governance arrangements; meeting international safeguards commitments; and compliance with legal requirements and any voluntary undertakings. This NOS describes the standard expected of individuals who are responsible for physical inventory taking and verification as part of the NMAS system.

Who is the NOS for?

This NOS is primarily for Nuclear Material Custodians and NMAS Managers within nuclear site license companies who are responsible for compliance with NMAS requirements for stocktaking and material verification at a plant or site level.

The main outcome of this activity is the production of a verified inventory list of all nuclear material present in the inventoried area at a specified point in time.

Where text is highlighted in bold, it is more fully defined in the Glossary section of this NOS.

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Performance criteria

You must be able to:

- P1 comply with the **NMAS requirements** for Physical Inventory Taking (PIT) at least annually
- P2 arrange PITs to optimise inventory accuracy to minimise measurement uncertainty and communicate/notify PIT frequency and timings in advance to **stakeholders as required**
- P3 review and apply **PIT procedures**, adjusting preparations in line with conditions expected at time of the PIT and arrangements and information requirements discussed with stakeholders
- P4 identify and document any areas where a PIT is not possible and establish suitable alternative arrangements
- P5 identify and obtain required manpower and assign and communicate all roles and responsibilities to those conducting the PIT and those resolving the results
- P6 obtain approval and remove access barriers to allow PIT or Physical Inventory Verification (PIV) to commence
- P7 identify and process any outstanding transaction data in order to obtain up-to-date lists of inventory items from the NMAS accountancy system
- P8 transfer materials to designated locations, ensure correctly labelled and identified and, if necessary, take measurements
- P9 establish and document inventory items present and resolve any **discrepancies**
- P10 take samples and readings from process equipment to produce a list of material in process sufficient to assign nuclear material mass
- P11 obtain relevant technical justifications to underpin estimated hold up values
- P12 follow security arrangements to prevent theft/diversion during PIT, and report suspected loss or falsification of data
- P13 authorise and issue the results of the PIT
- P14 support Physical Inventory Verification (PIV) by independent stakeholders
- P15 hold the PIT position as agreed with stakeholders until their PIV has taken place. Resolve differences between PIT & PIV
- P16 ensure data provision sufficient to allow calculation of overall material balance uncertainty and action levels.

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Knowledge and understanding

You need to know and understand:

- K1 the NMAS requirements, and **Supplementary Safeguards arrangements**
- K2 adequate **PIT/PIV capabilities and resources** appropriate to the required inventory taking/verification
- K3 packaging and container information (including tare weights), labelling and identification systems and physical location maps
- K4 **associated regulatory requirements** for the nuclear materials which have to be considered at PIT and for the staff conducting the PIT (e.g. personal protective equipment)
- K5 the PIT procedures, reconciliation methods, and audit arrangements
- K6 the NMAS **implementation framework** for the areas being inventoried and for problem resolution
- K7 **process context**
- K8 plant nuclear material holding locations and access arrangements
- K9 inventory assessment techniques for active/heterogeneous materials including destructive analysis sampling plans, sealing technical justifications and non-destructive analysis
- K10 the tools and techniques used by stakeholders for independent containment, surveillance and inventory verifications
- K11 the barriers to verification activities

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Additional Information

Glossary

Associated regulatory requirements: such as Safety, Security, Waste Management, Environmental Protection, Transport and Import/Export Controls.

Discrepancies: include:

- 1 differences between nuclear materials accounting information.
- 2 differences in material balance.
- 3 incorrect labelling of nuclear material packaging
- 4 incorrect characterisation of nuclear materials
- 5 nuclear material location errors

Implementation Framework: includes the NMAS physical and the managerial arrangements. It defines; the Material balance areas; transfer boundaries; key measurement points; NMAS capabilities, resources and infrastructure; control arrangements. It defines; organisational structures, responsibilities and accountabilities, separation of duties, those with direct custodial care of nuclear material and the competency framework.

NMAS: taken to include nuclear materials accountancy, nuclear materials control and nuclear material safeguards.

NMAS requirements: comprise mandatory requirements set down in binding legal contracts, set, set down in UK policy and commitments, and set down in national and international Treaties and Regulations (particularly the safeguards reporting regulations and associated implementation guidelines). They also include optional requirements to which the site voluntarily subscribes.

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PIT/PIV capabilities and resources: includes provision of:-

- 1 technical support for hold up estimation
- 2 technical support for statistical evaluations
- 3 equipment for handling, measurement and sealing
- 4 the PIT sampling schedule and prioritised analysis
- 5 sufficient time to meet PIT/PIV requirements
- 6 the PIT training and a competent workforce to carry out or supervise the PIT.
- 7 clear points of contact/responsibilities for PIT arrangements
- 8 automated data capture and transfer
- 9 support for independent stakeholder PIV including:
 - 9.1 sample taking and transport
 - 9.2 item handling and weighing/ non-destructive analysis
 - 9.3 escorting
 - 9.4 health physics support.

PIT procedures: includes

- 1 planning, and resource provision
- 2 controlling/suspending movements
- 3 emptying certain process areas
- 4 cleaning the plant and collection of residues
- 5 ensuring all measuring equipment is in calibration.
- 6 sampling requirements and prioritised analytical support
- 7 ensuring completeness and preventing duplication
- 8 executing the PIT and presenting the results
- 9 communicating PIT performance and corrective actions.

Process Context: includes the plant design, the measurement envelope, the physical and chemical properties of materials in the plant flow-sheet, the ionising radiation environment, measurement system maintenance and eventual decommissioning policy and the plant operating parameters and expected throughputs.

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Supplementary safeguards arrangements: this includes:

- 1 **BTC** - Basic Technical Characteristics required by the Euratom regulation to describe the site fuel cycle processes and NMAS related systems
- 2 **DI** - Design Information is the IAEA counterpart of the BTC and serves the same purpose
- 3 **PSP** - Particular Safeguards Provisions are additional (to the regulation) safeguards requirements specific to your site set out by Euratom.
- 4 **FA** - Facility Attachments is the IAEA counterpart of the PSP.
- 5 **AP submissions** – Details as required by the safeguards Additional Protocol.

Stakeholders: include:

- 1 contacts within the site, the organisation, the parent company, the site owner.
- 2 customers and contractors
- 3 public groups,
- 4 national bodies with responsibilities for NMAS including the Department for Energy and Climate Change (DECC), the Office for Nuclear Regulation (ONR) Safeguards function and the Ministry of Defence.
- 5 regulators including:
 - 5.1 the ONR Safety function, the ONR Security function, and the ONR Transport function (Radioactive Materials).
 - 5.2 environmental (EA, SEPA)
 - 5.3 the International Safeguard Inspectorates (the European Commission's Euratom Safeguards Inspectorate and the International Atomic Energy Agency Safeguards Inspectorate)

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Developed by Cogent

Version number 03

Date approved September 2011

Indicative review date September 2013

Validity Current

Status Original

Originating organisation Cogent

Original URN COGNMAS10

Relevant occupations Nuclear Material Custodians; NMAS Managers

Suite Nuclear Materials, Accountancy, Safeguards and Control (NMAS)

Key words Nuclear; Materials; Safeguards; Control