COGNMAS11
Investigate and resolve nuclear material accountancy and safeguards anomalies and discrepancies

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 investigating and resolving anomalies and discrepancies identified in the NMAS system.

Who is the NOS for?

This NOS is primarily for Nuclear Material Custodians. It is also applicable to Nuclear Material Accountants and NMAS Managers within nuclear site license companies who are responsible for compliance with NMAS requirements for investigating and resolving NMAS anomalies and discrepancies at a plant or site level.

The main outcome of this activity is the production of a report of the investigations, findings and corrective actions to resolve and mitigate NMAS anomalies and discrepancies.

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 initiate immediate actions commensurate with the significance of the **anomalies** or **discrepancies**, informing regulatory bodies and **stakeholders** as appropriate

P2 formulate an investigation team and develop an investigation plan and timetable commensurate with the significance of the NMAS anomaly or discrepancy in accordance with organisational procedures

P3 implement the investigation plan in accordance with your organisation's procedures, utilising lessons learned from similar occurrences

P4 review Inventory and Accountancy Records and any associated data from stakeholder's independent activities and analyse differences at accountancy points

P5 interview those involved in or affected by the occurrence in accordance with the plan, using effective evidence-gathering techniques

P6 establish the immediate and underlying causes of the NMAS anomaly or discrepancy

P7 identify any NMAS **deficiencies**, **measurement quality issues**, and issues which may impact on **supplementary safeguards arrangements**

P8 identify any non-compliance with organisational procedures which has led to the anomaly

P9 substantiate your conclusions and recommendations (for corrective action/data amendment or further investigation) on a sound analysis of the available evidence

P10 review the anomaly or investigation report and the company incident report database to identify the lessons learnt and make recommendations for improvements, further actions, and identification of risks

P11 report the results of your investigation in accordance with your organisation's procedures, corrective action and learning from experience systems and in line with stakeholder liaison requirements.

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Knowledge and understanding

You need to know and understand:

K1 the **NMAS requirements** for anomaly and discrepancy investigation and reporting, **associated regulatory requirements** for reporting incidents, and stakeholder interaction arrangements

K2 **measurement control programmes** and associated action levels

K3 **investigation team knowledge and authority requirements including root cause analysis, investigation competencies and separation of duties to avoid conflicts of interest**

K4 **knowledge management** systems and sources of historic performance, investigations, corrective action and testing

K5 the procedures in place for those areas and materials under investigation including

- K5.1 **implementation framework**
- K5.2 **process context**
- K5.3 **NMAS risk assessments**
- K5.4 **quality controls**
- **K5.5 supplementary safeguards arrangements**

K6 **documentation of the NMAS measurement requirements**

K7 relevant **estimation and assignment methods**

K8 the organisational procedures for nuclear material anomaly and discrepancy reporting and conduct of anomaly and discrepancy investigations

K9 the organisational incident monitoring and Learning from Experience (LFE) procedures

K10 technology and standards appropriate to the anomaly under investigation

K11 tools and techniques for conducting investigations, evidence-gathering and preservation, problem solving, root cause analysis, and report writing

K12 sources of information relevant to the investigation, including sources of good practice and LFE from elsewhere

K13 sources of specialist support, advice and information and how to access these

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Additional Information

Glossary

Anomalies: are NMAS discrepancies that are consistent with the absence or gain of a significant amount of nuclear material. These include:

1 unacceptable losses or gain detected by the account balances or by process monitoring

2 loss or gain of a discrete item on site or in transit

3 significant finds of nuclear material

4 unacceptable shipper/receiver difference

Associated Regulatory requirements: such as Safety, Security, Waste Management, Environmental Protection, Import/Export controls, and Transport

Deficiencies: are shortcomings in performance or capability which put the NMAS system at risk. These vulnerabilities include for example:

1 insufficient protection of NMA data against falsification or loss of classified data

2 unreliable or inadequate measurement systems subject to frequent failure, bias, or intolerable uncertainties.

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

Documentation of the NMAS measurement requirements: includes:

1 the key measurement points in the accounting area

2 accountancy data and its transmission

3 values for equipment precision and accuracy

4 the measurement goals and target achievements set out in the design.

Estimation and Assignment methods: include modelling, statistical analysis and historic review.

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.

Knowledge Management: includes capture of all available sources of knowledge, including tacit knowledge of previous operational staff

Measurement Control Programme: is a system to ensure the effectiveness of measurement and analytical systems and the quality and validity of resulting data that is generated for nuclear material accountancy and safeguards purposes. Quality controls include performance monitoring, testing and analysis, calibration and certification, control of certified reference materials and sources.

Measurement quality issues: may include :

1 making appropriate on-plant adjustments

2 investigating and reporting any suspected unauthorised tampering or attempts to bypass measurement points

3 eliminating or compensating for bias, reduce factors which impact on measurement variability

4 reviewing correction/compensation factors and drive measurement quality improvement and trials.

NMAS: is 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.

NMAS risk assessment: is the analysis of the risk of diversion of nuclear material and involves postulating unauthorised removal scenarios and assessing the controls required to mitigate the risk. It also includes assessing the risk of various material forms and flows and measurement limitations to the overall capability and quality of the NMAS system.

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.

Quality control: includes performance monitoring and testing, quality control and quality assurance, record keeping, and where appropriate, measures to protect from unauthorised tampering or prevent measurement systems being bypassed.

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)

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.

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