

<b>Nuclear Material Accountancy</b>			
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# 1. Introduction

1. We have established guidance in the form of Technical Assessment Guides (TAGs) in our role as the state regulatory authority (SRA) for safeguards in the UK to guide regulatory judgements and recommendations when undertaking safeguards assessments of operator submissions. The outcome of our assessment is to reach an independent and informed judgement on the adequacy of a safeguard's nuclear material accounting report submission. This TAG contains guidance to advise and inform our inspectors in the exercise of their regulatory judgment.
2. Underpinning the requirement for these submissions, and our role in their regulation, are the legal duties placed on operators subject to the Nuclear Safeguards (EU Exit) Regulations 2019 (hereafter referred to as NSR19) [1].
3. The IAEA Safeguards Glossary [2] refers to nuclear material accounting as:

“Activities carried out to establish the quantities of nuclear material present within defined areas and the changes in those quantities within defined periods.”
4. It also defines nuclear material accountancy as:

“The practice of nuclear material accounting as implemented by the facility operator and the SSAC, inter alia, to satisfy the requirements in the safeguards agreement between the IAEA and the State (or group of States); and as implemented by the IAEA, inter alia, to independently verify the correctness of the nuclear material accounting information in the facility records and the reports provided by the SSAC to the IAEA.”
5. Nuclear material accounting and accountancy underpins regulatory compliance and informs inspection and assessment activities.

## 2. Purpose and Scope

6. This TAG contains guidance to advise and inform our inspectors in the exercise of their regulatory judgement during assessment activities relating to data contained within operator inventory change reports (ICRs), material balance reports (MBRs), physical inventory listing (PILs) and special reports required by Regulations 14, 15 and 16 of the NSR19.
7. This TAG also provides appropriate guidance for use during other safeguards inspection and assessment activities, including those activities undertaken to determine operator compliance with the Regulation 29 requirements associated with qualifying nuclear material (QNM) in the form of conditioned and retained waste.
8. This TAG is written as guidance for our inspectors to carry out their regulatory duties. It is not written for operators and although it may be used by operators as a source of guidance or good practice, it should not be interpreted by operators as a set of prescriptive legal requirements unless quoted as so.
9. When used in this document the term 'operator' should be considered as that defined in Regulation 2 of NSR19:

“operator” means a person or undertaking setting up, operating, closing down or decommissioning a qualifying nuclear facility (QNF) for the production, processing, storage, handling, disposal or other use of qualifying nuclear material (QNM).

### 3. Relationship to UK Voluntary Offer Agreement and Nuclear Safeguards (EU Exit) Regulations 2019

10. The UK has a bilateral voluntary offer safeguards agreement (VOA) with the IAEA [3]. A fundamental requirement in fulfilling the terms of this agreement is the provision of information concerning nuclear material subject to the agreement to the IAEA.
11. This information predominantly takes the form of nuclear material accounting reports as defined by Articles 60-66 of the VOA.
12. As set out in Regulation 42 of NSR19, we have responsibility, on behalf of the United Kingdom, for providing timely and accurate nuclear material accounting reports to the IAEA.
13. We obtain the information required for these nuclear material accounting reports directly from UK operators as a result of the requirements placed on them by the NSR19.
14. To achieve sustained delivery of our obligations under the VOA, we need to undertake suitable and sufficient assessment of the information provided by UK operators prior to conversion to the required IAEA Code 10 nuclear material accounting format prior to onward transmission to the IAEA.
15. This is achieved in large part by assessing operator compliance with the corresponding NSR19 requirements outlined in Regulations 12, 14, 15 and 16 which require the operator to produce and submit accounting reports for each material balance area using the relevant format defined in Parts 2, 3 and 4 of Schedule 1 of the NSR19.

## 4. Relationship to ONR Guidance for the Assessment of Nuclear Material Accountancy Control & Safeguards and International Standards

16. The ONR Guidance for Nuclear Material Accountancy Control & Safeguards (ONMACS) [4] contains regulatory expectations and associated guidance. The expectations form the underlying basis for regulatory judgements made by our inspectors and constitute safeguards relevant good practice.
17. ONMACS is guidance for inspectors, not a national policy document, and it provides our inspectors with a framework for making consistent regulatory judgements on the adequacy of operators' nuclear material accountancy, control and safeguards (NMAC&S) arrangements.
18. Sections of ONMACS will be of relevance to our inspectors when assessing operator nuclear material accounting report submissions, in particular, but not limited to:
  - MACE 7.2 Identification of QNM
  - MACE 8.2 Compilation of Nuclear Material Accounts Material.
  - MACE 9.1 On/Off Site Movements of QNM
  - MACE 9.3 Material Balance Evaluation

## 5. Advice to Inspectors

19. Assessment of the nuclear material accounting reports submitted to us in accordance with NSR19 includes comprehensive assessment against prescriptive requirements detailed within the NSR19. In order to facilitate this approach, the Safeguards Information Management and Reporting System (SIMRS) has been developed and includes numerous validation checks that support the assessment of nuclear material accounting reports.
20. SIMRS validation checks focus primarily on the prescriptive formatting requirements of nuclear material accounting reports.
21. SIMRS does not make regulatory judgements on compliance, that is the responsibility of the inspector.
22. Assessment should be undertaken of both individual nuclear material accounting reports, the collective set of reports that constitute a material balance period (MBP) and longer periods of time to identify any trends or patterns in the data.
23. The assessment approach outlined may include verification that the nuclear material accounting reports are substantiated by a set of underpinning operating and accounting records either during inspection activities or upon our request of information from the operator.
24. Inspection in support of nuclear material accountancy assessment should be against an appropriate sample of the data contained in the operators' nuclear material accounting reports.
25. The Safeguards Technical Inspection Guide [5] provides additional information on undertaking of accountancy-focussed inspections.

### 5.1. Nuclear Material Accounting Report Assessment

26. Inspectors should assess compliance by comparing the nuclear material accounting reports against the prescriptive requirements in NSR19 and then assess the accuracy and adequacy of the declared information based on the expectations set down in ONMACS and references therein.
27. All activities related to the assessment of the nuclear material accounting reports should be captured by the inspector in an appropriate assessment record.
28. Where non-compliance is identified, the assessment record should state the inspector's judgment on the degree of any non-compliance and proposed regulatory action which may include advice to the operator on how to achieve compliance.

29. Inspectors should ensure that any non-compliances and resulting actions to be taken by the operators are managed utilising our regulatory issues process [6].
30. Inspectors should consider other relevant documents to inform the assessment such as the Facility Attachments (FAs), Basic Technical Characteristics (BTCs), Accountancy and Control Plans (ACPs), joint BEIS/ONR implementation guidance on new UK nuclear cooperation agreements (NCAs) or any Particular Safeguards Provisions (PSPs) made under Regulation 5 of NSR19.

## 5.2. Regulatory Requirements

31. The inspector should determine, inter alia, the following during assessment:
  - that the nuclear material accounting reports contain up to date information and have been corrected if necessary.
  - that the nuclear material accounting reports have been submitted in line with the timeliness requirement outlined within the NSR19 and that they cover the correct reporting period.
  - that the nuclear material accounting reports contain inventory data reported (as a minimum) to the nearest gram.
  - that the nuclear material accounting reports contain separate line entries for each category of QNM.
  - whether all the requirements within a relevant PSP and / or FA have been complied with.
  - that nuclear material accounting reports contain appropriate reference to the country and location from, or to which QNM is received or shipped internationally.
  - that appropriate reference is included to the material balance area from, or to which QNM is received or shipped domestically.
  - that appropriate advance notification references are included when reporting international receipts or shipments to or from the MBA.
  - that corrections entries are reported in line with the regulations, and that any reference to a previous data entry is accurate, transparent and includes appropriate CRC references.
  - The full set of prescriptive requirements associated with nuclear material accounting report format and content is outlined in Schedule 1, Part 2, 3, 4 and associated explanatory notes of NSR19 and should be considered during assessment.



## 5.3. Regulatory Expectations

32. The nuclear material accounting reports should:

- be representative of the general facility type and more specifically, accurately reflect the BTCs declared for the MBA.
- cover the correct reporting period and in totality provide a continuous timeline for nuclear material accounting within the MBA.
- show that, for each QNM category and obligation arising from relevant international agreements (NSR19 Regulation 19), the book account inventory remains accurately reported in ICRs.
- show that, for each QNM category and obligation, the physical beginning and ending balances declared in the MBR for the MBP accurately reflect the inventory data reported in the corresponding PIL.
- show that, for each QNM category and obligation, the consolidated inventory change data declared in the MBR accurately reflect the individual changes reported in the ICRs for the corresponding MBP.
- if we request additional supporting information, show that, for each QNM category and obligation, non-zero inventory differences (IDs) can be explained by measurement uncertainty.
- if we request additional supporting information, show that any reported shipper receiver differences (SRDs) are within tolerance of agreed action levels.
- contain accurate inventory data associated with accidental gains or losses of QNM as reconciled against a special report provided to us and that the associated special report reference is included within the “Comments” field of that associated reporting line.
- contain accurate inventory data associated with imports and exports of QNM as reconciled against advanced notifications provided to us.
- contain accurate inventory data associated with withdrawals of QNM from safeguards as reconciled against an associated request received by us for which we have provided written consent.
- contain accurate inventory data associated with termination of safeguards on QNM.
- be able to be substantiated against operator operating and accounting records (if requested by us) e.g., list of inventory items (LII), measurement data used for QNM inventory quantification, data obtained from calibration of tanks and instruments and from sampling



analysis, the procedures employed to control the quality of measurements and the derived estimates of random and systematic uncertainties, etc.

- be able to be reconciled to support the closure or consolidation of MBAs.

# References

- [1] HM Government, “The Nuclear Safeguards (EU Exit) Regulations 2019,” [Online]. Available: <https://www.legislation.gov.uk/uksi/2019/196/contents/made>.
- [2] IAEA, “IAEA Safeguards Glossary 2001 Edition - International Nuclear Verification Series No. 3”.
- [3] UK/IAEA, “Agreement for Application of Safeguards in Connection with Treaty on the Non-Proliferation of Nuclear Weapons [MS No.13/2018],” 2018. [Online].
- [4] ONR, ONR-CNSS-MAN-001, “ONR Nuclear Material Accountancy Control & Safeguards (ONMACS) Assessment Principles”.
- [5] ONR, SG-INSP-GD-001, "Safeguards Technical Inspection Guidance”.
- [6] ONR, ONR-RIO-PROC-001, "Management of Regulatory Issues”.
- [7] EU, “Commission recommendation of 15 December 2005 on guidelines for the application of Regulation (Euratom) No 302/2005 on the application of Euratom safeguards (notified under document number C(2005) 5127) (2006/40/Euratom)”.
- [8] UK/IAEA, “INFCIRC/570, Communication received from the United Kingdom of Great Britain and Northern Ireland, United Kingdom Fissile Material Transparency, Safeguards and Irreversibility Initiatives”.

# Glossary and Abbreviations

AR	Assessment Record
BTC	Basic Technical Characteristics
CNSS	Civil Nuclear Security & Safeguards (Office for Nuclear Regulation)
FA	Facility Attachment
ICR	Inventory Change Report
IAEA	International Atomic Energy Agency
MBR	Material Balance Report
NCA	Nuclear Cooperation Agreement
NSR19	The Nuclear Safeguards (EU Exit) Regulations 2019
ONMACS	ONR Guidance on Nuclear Material Accountancy, Control & Safeguards
ONR	Office for Nuclear Regulation
PIL	Physical Inventory Listing
PSP	Particular Safeguards Provisions
QNF	Qualifying Nuclear Facility
QNM	Qualifying Nuclear Material
SIMRS	Safeguards Information Management and Reporting System
TIG	Technical Inspection Guide
TAG	Technical Assessment Guide
VOA	Voluntary Offer Agreement

# Appendix 1

## General Expectations

### Report and Line Numbering

1. All the nuclear material accounting reports will be numbered sequentially (no gaps) per MBA regardless of the type of report. Each line will have its own unique sequential number (no gaps) starting from one in each report.
2. Example: MBA QXXX reporting the February's ICR, and having a PIT on 14 March
  - February's ICR will have report number X (i.e.: 150)
  - March's ICR from the first day until the PIT date, report number X+1 (i.e.: 151)
  - PIL, report number X+2 (i.e.: 152)
  - MBR, report number X+3 (i.e.: 153)
  - March's ICRs, from the day after the PIT until the end of month, X+4 (i.e.: 154)

### Accounting Reports Files: Preferred Naming Convention

3. Each nuclear material accounting report is uniquely identified by the information contained in its header.
  - MBA\_YYYYMM\_ReportType\_ReportNumber
  - MBA – The four letter MBA code for which the report covers
  - YYYYMM – The four-digit year and two-digit month
  - Report Type – The type of report being submitted i.e. I = ICR, P = PIL, M = MBR
  - Report Number – The Report number reported in the header of the report.

## Physical Inventory Listing

4. The tables below show the labels to be used in PILs, the circumstances in which they should be used and whether their use is required (R), preferred (P) or optional (O).

## Header

- The following header labels at report level are all mandatory. They must occur only once per report header.

Field Number	Label/Tag
1	MBA
2	Report type
3	Report date
4	Report number
5	PIT Date
6	Line Count
7	Reporting person

## Detail Lines

Field No.	Label/Tag	Entry Status			
		New Entry	Late	Addition	Delete
8	PIL ITEM ID	R	R	R	P
9	Batch	R	R	R	P
10	KMP	R	R	R	P
11	Measurement	R	R	R	P
12	Element Category	R	R	R	P
13	Material Form	R	R	R	P
14	Material Container	R	R	R	P
15	Material State	R	R	R	P
16	Line Number	R	R	R	R
17	Item	R	R	R	P
18	Element Weight	R	R	R	P
19	Isotope	R	R	R	P
20	Fissile Weight	R	R	R	P
21	Obligation	R	R	R	P
22	Document	O	O	O	O
23	Container ID	O	O	O	O
24	Correction	N/A	R	R	R
25	Previous Report	N/A	R	R	R
26	Previous Line	N/A	R	R	R
27	Comment	O	O	O	O
28	CRC	R	R	R	R
29	Previous CRC	N/A	N/A	R	R

## Inventory Change Report

### Inventory Change Codes and Sign Convention

- For the following inventory change codes, the element and isotope weights reported by the operator should be positive integers but will regardless, be

interpreted as positive or negative contributions to the nuclear material inventories depending on the inventory change (IC) Code declared.

IC Code	Change in inventory
RD / RF/ RN	Positive
SD / SF/ SN	Negative
TC	Negative
TE	Negative
TW	Negative
FC	Positive
FW	Positive
LA	Negative
GA	Positive
CC / CE/ CB	Positive
BR / CR / PR / SR	Positive
MP	Positive
TU	Negative

- For the following inventory change codes, the element and isotope weights reported by the operator should be positive or negative depending on the required inventory change and will be interpreted accordingly.

IC Code	Change in inventory
NP	As declared
NL	As declared
NM	As declared
DI	As declared
BJ	As declared
MF	As declared
RA/R5	As declared
BA	As declared

### Inventory Change Report Labels

- The tables below show the labels to be used in ICRs, the circumstances in which they should be used and whether their use is required (R), preferred (P) optional (O).

#### Header

- The following header labels at report level are all mandatory. They must occur only once per report header.

Field Number	Label/Tag
1	MBA
2	Report type
3	Report date
4	Report number
5	Line count
6	Start report
7	End report
8	Reporting person

### Detail Lines

Field No.	Label/Tag	Condition	Entry Status			
			New Entry	Late	Addition	Delete
9	Transaction ID		R	R	R	R
10	IC Code		R	R	R	P
11	Batch	Not required for BA, BJ or MF IC Codes	R	R	R	P
12	KMP	Not required for BA, BJ or MF IC Codes	R	R	R	P
13	Measurement Basis	Not required for BA, BJ or MF IC Codes	R	R	R	P
14	Material Form	Not required for BA, BJ or MF IC Codes	R	R	R	P
15	Material Container	Not required for BA, BJ or MF IC Codes	R	R	R	P
16	Material State	Not required for BA, BJ or MF IC Codes	R	R	R	P
17	MBA From	Required for RD and RF IC Codes	R	R	R	P
18	MBA to	Required for SD and SF IC Codes	R	R	R	P
19	Previous Batch	Required when IC Code is RB	R	R	R	P
20	Original Date	Required when making a correction	N/A	R	R	P
21	PIT Date	Required only when MF IC Code is reported	R	R	R	P
22	Line Number		R	R	R	R
23	Accounting Date		R	R	R	R
24	Item	Not required for BA, BJ or MF IC Codes	R	R	R	P
25	Element Category		R	R	R	P
26	Element Weight		R	R	R	P



Field No.	Label/Tag	Condition	Entry Status			
			New Entry	Late	Addition	Delete
27	Isotope	Required if Element category is H or L or if required by PSP	R	R	R	P
28	Fissile Weight	Required when Isotope Filed is populated	R	R	R	P
29	Isotopic Composition	If required by PSP	R	R	R	P
30	Obligation		R	R	R	P
31	Previous Category	Required when IC Codes CB, CC or CE is used	R	R	R	P
32	Previous Obligation	Required when IC Codes BR, CR, PR or SR is used	R	R	R	P
33	Document		O	O	O	O
34	Container ID		O	O	O	O
35	Correction		N/A	R	R	R
36	Previous Report		N/A	R	R	R
37	Previous Line		N/A	N/A	R	R
38	Comment		O	O	O	O
39	Burn Up	Required when IC Code NP or NL is used at a Reactor Facility	R	R	R	P
40	CRC		R	R	R	R
41	Previous CRC		N/A	N/A	R	R
42	Advance Notification	Required when IC Code RF or SF is used in accordance with Regulation 21 and 22	R	R	R	P
43	Campaign		R	R	R	P
44	Reactor		R	R	R	P
45	Error Path		O	O	O	O

## Material Balance Report

### Material Balance Report Labels

- The tables below show the labels to be used in MBRs, the circumstances in which they should be used and whether their use is required (R), optional (O) or preferred (P).

## Header

11. The following header labels at report level are all mandatory. They must occur only once per report header.

Field Number	Label/Tag
1	MBA
2	Report type
3	Report date
4	Start Report
5	End Report
6	Report Number
8	Line Count
9	Reporting person

## Detail Lines

Field No.	Label/Tag	Entry Status			
		New Entry	Late	Addition	Delete
7	Element Category	R	R	R	P
10	IC Code	R	R	R	P
11	Line Number	R	R	R	R
12	Element Weight	R	R	R	P
13	Isotope	R	R	R	P
14	Fissile Weight	R	R	R	P
15	Obligation	R	R	R	P
16	Correction	N/A	R	R	R
17	Previous Report	N/A	R	R	R
18	Previous Line	N/A	R	R	R
19	Comment	O	O	O	O
20	CRC	R	R	R	R
21	Previous CRC	N/A	N/A	R	R

## Cyclic Redundancy Check (CRC) Algorithm

12. The algorithm to be used when generating CRC entries within nuclear material accounting reports is defined in appendix 4.2 of the Commission Recommendation of 15 December 2005 on guidelines for the application of Regulation (Euratom) No 302/2005 on the application of Euratom safeguards [7].

# Appendix 2

## Exemptions and De minimis Reporting Levels for QNM

### Exemption

1. Within Regulation 32 of NSR19 there are two defined exemptions.
  - (1) The requirements of these Regulations do not apply to a person who holds only end products which are used for non-nuclear purposes, and which incorporate qualifying nuclear material that is, in practice, irrecoverable.
  - (2) The requirements of these Regulations do not apply to an operator of a qualifying nuclear facility, which—
    - (a) is—
      - (i) a primary or a secondary school, as defined in section 5(1) and (2) of the Education Act 1996(1).
      - (ii) a 16 to 19 Academy, as defined in section 1B of the Academies Act 2010(2): or
      - (iii) a sixth form college, as defined in section 91(3A) of the Further and Higher Education Act 1992(3); and
    - (b) holds an amount equal to 0.01 effective kilograms or less of uranium or thorium where, in the case of uranium, the isotopes 235 and 233 comprise 1% or less of the total mass of uranium held.
      - The following are some examples where a Regulation 32(1) exemption is applicable:
        - Uranium or Thorium used in decorative glazes in ceramics.
        - Uranium or Thorium used as colourant in decorative glass.
        - Uranium or Thorium used as coating of filaments for fluorescent lamps or specialist lenses.
        - Thoriated Welding Rods.

## De Minimis Quantities

2. Although no de minimis reporting level is defined in NSR19, ONR recognises that there are concentrations or other threshold factors beyond which it is inappropriate and disproportionate to account for QNM.

## Concentration

3. These include where QNM is in the form of:

A contaminant in a bulk of material destined for disposal or non-nuclear use at concentrations not exceeding:

- 1 gram in 1,000 thorium.
- 1 gram in 1,000 depleted and natural uranium.
- 1 gram in 5,000 of low enriched uranium.
- 1 gram in 100,000 of high enriched uranium.
- 1 gram in 250,000 of plutonium.

Uranium ores/mineral samples containing less than 0.1% uranium, thorium bearing ores containing less than 3% thorium, and monazites containing less than 10% thorium or 0.1% uranium.

## Other Threshold Factors

4. In materials where recovery of QNM would be considered impractical due to financial or practical constraints e.g., extraction of trace amounts of QNM in seawater or soil.

## Reporting Efficiencies

5. Where sub-gram quantity items are held in discrete containers and contain higher concentrations of QNM (e.g., metallic uranium or plutonium) than those listed above, the items should be accounted for, especially if there are many such items. A proportionate approach to accounting for this QNM could be to aggregate such items and report them as a single batch with the number of items, provided they share the same QNM characteristics (i.e., the same material description code can be applied).
6. All QNM item weights should be recorded to the same level of significance (as determined by the sensitivity or capability of the measurement) for the purpose of aggregating and to minimise the impact of rounding.

## Termination of Safeguards

### Use of TE

7. When QNM is contained in waste that is measured, or has been estimated on the basis of measurements, and has been irrevocably discarded to the environment as the result of a planned discharge, the TE inventory change code should be used. The quantity of QNM is to be removed from the inventory of the reporting MBA.

### Use of TU

8. The use of the TU inventory change code should be agreed with us in advance of termination of safeguards on QNM. Once its use is agreed, it should then be included in the relevant nuclear material accounting report. The quantity of QNM is then removed from the inventory of the reporting MBA.
9. The TU inventory change code should be used to report QNM determined to have become practicably irrecoverable which is incorporated in end products used for non-nuclear purposes, or when the QNM is contained in waste in very low concentrations (as set out in section 2.1) measured or estimated on the basis of measurements.

## Withdrawals from Safeguards

10. Withdrawals of QNM from civil activities should be reported using the inventory change code SN and have our written consent before it is reported in an ICR.
11. In line with UK policy commitments in INFCIRC/570 [8], withdrawals of QNM from civil activities should only involve small quantities of QNM not suitable for nuclear explosive purposes (e.g., material purchased from civil manufacturers for such uses at defence nuclear facilities as calibration of instruments and radiography and shielding of radiological sources). Information on these withdrawals is published each year on the ONR website.

## Correction Methods

12. If corrections to nuclear material accounting reports are required, then they should be undertaken using the following methods only:
  - Deleting a previous entry in a nuclear material accounting report
  - Correcting a previous entry in a nuclear material accounting report by use of a Delete/Add pair



- Adding an entry to a nuclear material accounting report by use of a Late Line
13. The corresponding codes Delete (D), Add (A) or Late (L) must be reported in the correction field within the nuclear material accounting report.
  14. When a correction is reported, the day, month, and year when the line to be corrected was originally entered must be reported in the original date field.
  15. For correction chains, the original date is always the accounting date of the first line in the chain.
  16. For late lines (stand-alone additions), the original date is the date on which the inventory change occurred.

## Advanced Notifications

17. An advance notification of imports and exports of QNM in excess of one effective kilogram is always required.
18. Where individual imports or exports of QNM do not exceed one effective kilogram, an advance notification should be provided only if the cumulative total of transfers to another state is likely to exceed one effective kilogram during any consecutive 12-month period.
19. This determination should be made solely on imports and exports of QNM that do not exceed one effective kilogram. i.e., if an advance notification has been provided for the export of QNM in excess of one effective kilogram to a state, advance notifications are not automatically required for subsequent exports of less than one effective kilogram of QNM to the same state unless those specific exports are likely to exceed one effective kilogram during any 12 consecutive months.
20. Where an advance notification is provided, it should be appropriately referenced in the nuclear material accounting reports.

## Nuclear Material Identification and Tracking

21. Batch identification within a PIL should be unique to the reporting MBA.
22. Batch identification should be unique to the reporting MBA for any transaction on a single date.
23. The batch identification used by the shipper must be reported by the receiving MBA ICR for the initial receipt of QNM using either RD or RF inventory change codes as appropriate.
24. Subsequent reporting of changes to the structure or identification of a batch should be reported through use of the RB inventory change code and should

be suitably transparent in nuclear material accounting reports to allow batch traceability.

## Example Accounting Methodologies for Gains, Losses, and Inventory Adjustments

- 25. The table below provides an indicative and non-exhaustive list of relevant good practice methodologies for reporting gains, losses, and inventory adjustments to QNM inventories within a QNF.
- 26. This table is not intended to present prescriptive requirements. For more complex situations that do not easily fall into any of the categories discussed below, advice should be sought from us.

Description of scenario	Accountancy code to be used
1.The weight of a batch declared in a PIL is not the same as the weight of the same batch receipt declared in the corresponding ICR prior to the PIT.	This will result in the associated change in inventory becoming an explainable proportion of the inventory difference reported for that material balance period.
2.The weight of a batch changes. e.g., Original reported weight was an estimate, the batch was subsequently measured. e.g., A batch was reweighed after it was discovered the original weight was inaccurate.	'NM' to be declared.
3.The original weight of a batch was determined as incorrect and originates from a different MBA. Both MBAs are prepared to correct the weights in declarations. e.g., The weight of a batch shipped from MBA 'A' to MBA 'B' was incorrectly entered into operator 'A's information management system, so the wrong weight became associated with the batch. Both MBAs agree to collaboratively correct declarations.	'Delete / Add' line to be declared to correct the weight of the batch.

Description of scenario	Accountancy code to be used
<p>4. The original weight of a batch was determined as incorrect and originates from a different MBA on a different site. The donor MBA is unable to correct the weight in a declaration.</p> <p>e.g., The weight of a batch shipped from MBA 'A' to MBA 'B' was incorrectly entered into operator 'A's information management system so the wrong weight became associated with the batch. MBA 'A' is not able to change the original weight.</p>	<p>'DI' to be declared to correct the weight of batch.</p>
<p>5. A batch of QNM from previously safeguarded activities is created by a process (including POCO and decommissioning) and remains in the MBA until the next PIT.</p>	<p>The batch should be either reported as a new measurement (NM) based on best available figures, ideally following measurement of the QNM, or reported directly onto the next PIL as a new batch. If a measurement is not made immediately, it should be made as soon as possible, and the NM corrected via delete/add lines.</p>
<p>6. A batch of QNM from previously safeguarded activities is created by a process (including POCO and decommissioning) and is subsequently removed from the inventory of the MBA prior to the next PIT.</p>	<p>The batch should initially be reported as a new measurement (NM) based on the best available figures, ideally following measurement of the QNM. It should then be removed from the MBA inventory using the appropriate inventory change code.</p>
<p>7. A discrete item or items of QNM are found whose origin is either unknown, or the item is not currently included on the inventory of the MBA.</p>	<p>'GA' to be declared based on the best available figures, ideally following measurement of the material. If not measured immediately, a measurement should be made as soon as possible, and the GA corrected via delete / add lines.</p>
<p>8. QNM is found in an area which is not expected to contain any.</p>	<p>'GA' to be declared.</p>
<p>9. QNM is found in an MBA, the item can be identified as a product from a process in the donor MBA, but the movement of the item was not recorded in an ICR.</p>	<p>A 'Late' line to be declared.</p>



Description of scenario	Accountancy code to be used
10. A batch is re-batched into more than one batch and the weight attributed to each portion does not add up to the original weight due to rounding.	'RA' line to be declared.
11. Material weights have a different reporting precision between ICRs/MBRs and PILs that leads to a rounding discrepancy.	'RA' line to be declared.
12. A Batch with a non-integer weight is moved from an area where accountancy is performed at the milligram level to an area where accountancy is performed at the gram level.	'RA' line to be declared in the area that reports at the gram level.
13. QNM is identified in an MBA that can be traced back to past military activities.	The QNM should be reported as a receipt from non-safeguarded activities (RN) based on the best available figures, ideally following measurement of the material. If the material cannot be measured immediately, a measurement should be made ASAP and the RN corrected by delete/add lines.
14. QNM is identified in an MBA that can be traced back to civil activities pre-dating safeguards implementation.	The QNM should be accounted for as for past military activities.
15. QNM is identified in an MBA which has previously performed mixed civil / military activities.	If the QNM can be split into separate civil and military arisings in proportion, and the civil portion was previously accounted for under safeguards, then the arisings should be accounted for as described in examples 5 and 13 above respectively. If the arisings cannot be split, then all QNM should be accounted for as civil arisings or if those civil activities pre-dated safeguards, then the material should be accounted for as for past military activities.
16. QNM is found to have irrecoverably leaked from its containment.	'LA' to be declared based on the best available figures.
17. A discrete item or items of QNM, previously included on the inventory of the MBA are not able to be confirmed as being present within the MBA.	'LA' to be declared.

## Special Reports

27. Where a special report is required to be reported by the operator in line with the requirements of Regulation 16 of the NSR19, namely.

(1) An operator must send to the ONR a special report whenever the circumstances referred to in regulation 17 or 23 arise.

The minimum expectation on content is as follows:

- The site, location, or premises at which the incident occurred.
- Date when the incident occurred and / or when the circumstances were established.
- A description of the actions taken to ascertain the cause of the incident or circumstances.
- The cause and features of the incident / circumstances.
- The estimated quantity and characteristics of any QNM which has been gained or lost.

28. Regulation 17 details those circumstances as being.

(1) The circumstances referred to in regulation 16(1) are—

(a) as a result of any unusual incident or circumstances, an operator believes that there has been or might be an increase in or a loss of qualifying nuclear material; or

(b) the containment of qualifying nuclear material has unexpectedly changed to a point where an unauthorised removal of qualifying nuclear material has become possible.

(2) An operator must submit a special report **as soon as it becomes aware** of any such loss or increase or sudden change in the containment conditions, or of anything which leads them to believe that there has been such an occurrence

29. Regulation 23 details those circumstances as being:

Loss or delay during transfer

An operator must send us a special report under regulation 16 **as soon as the operator becomes aware** that QNM has been or appears to have been lost during transfer or that there has been a considerable delay during transfer.

30. As highlighted in the regulatory text above the timeliness requirements for the submission of special reports is as soon as the operator becomes aware.
31. If we request further detail or explanation in connection with a special report, the operator must send it to us without delay.
32. For onward transmission to the IAEA as required by Article 66 of the UK/IAEA Safeguards Agreement the following criteria should be considered:

#### ARTICLE 66

The United Kingdom shall make special reports without delay:

(a) if any unusual incident or circumstances lead the United Kingdom to believe that there is or may have been loss of nuclear material that exceeds the limits specified for this purpose in the Subsidiary Arrangements; or

(b) if the containment of nuclear material subject to safeguards under this Agreement has unexpectedly changed from that specified in the Subsidiary Arrangements to the extent that its unauthorized removal has become possible.

Where facility attachments have been agreed with the IAEA the circumstances in which a special report is required are defined in more detail.

If onward transmission to the IAEA is required then it is to be reported without delay, and in any event within 72 hours following the event.

If the IAEA request amplification and clarification of a special report it should be sent immediately on receipt of IAEA's request or as soon as possible thereafter.

## Accountancy Requirements for Nuclear Material Contained in Retained or Conditioned Waste

### Nuclear Material Contained in Retained Waste

33. When QNM is transferred from the main inventory to retained waste using the inventory change code TW it should retain any associated obligation code.
34. When retained waste is brought back onto the main inventory, using code FW (transfer from retained waste) the original obligation should be associated with the QNM.
35. Processing of retained waste, without moving it from its MBA, can be performed without returning the waste to the main inventory. However, if the

processing involves the separation of elements, then the operator is required to inform us of such processing in its programme of activities.

36. Operators should maintain operating and accounting records, suitable to allow the inventory of each category of QNM in retained waste to be accurately established at any time.
37. Operators are required to undertake an annual PIT, however the PIT for retained waste does not require remeasurement of the QNM to be undertaken.
38. The operator should maintain a list of their retained waste and ensure that the list is updated after the PIT.

### Nuclear Material Contained in Conditioned Waste

39. When QNM is transferred from the main inventory to conditioned waste using the inventory change code TC it should retain any associated obligation code.
40. This QNM is normally considered as not being subject to IAEA safeguards under the VOA.
41. NSR19 does not prescribe requirements relating to the format in which retained and conditioned waste stock lists should be maintained by an operator, it is however considered good practice for an operator to be able to provide us with suitable information for each category of QNM such that individual batches can be identified and any subsequent retransfer from retained waste back to the main inventory can be accurately reported.