



ONR GUIDE			
<b>Nuclear Material Accountancy</b>			
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### 1. INTRODUCTION

1.1 The Office for Nuclear Regulation (ONR) is the independent regulator of nuclear safety and conventional health and safety on nuclear sites, civil nuclear security in civil nuclear premises, civil radioactive material transport and nuclear safeguards across the United Kingdom.

1.2 Guidance in the form of Technical Assessment Guides (TAG) is derived from ONR's role as the regulator to guide regulatory judgements and recommendations when undertaking safeguards assessments of operator submissions.

Underpinning the requirement for these submissions, and ONR's role in their regulation, are the legal duties placed on organisations subject to the Nuclear Safeguards (EU Exit) Regulations 2019 (hereafter referred to as NSR19) [1].

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”*

1.4 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”*

1.5 Nuclear material accounting and accountancy underpins regulatory compliance and drives inspection activities.

### 2. PURPOSE AND SCOPE

2.1 This TAG contains guidance to advise and inform ONR Inspectors in the exercise of their regulatory judgment during assessment activities relating to data contained within operator submissions of Initial Inventory, Inventory Change Reports, Material Balance Reports and Physical Inventory Listing required by Regulations 13, 14 and 15 of The NSR19.

### 3. RELATIONSHIP TO UK VOLUNTARY OFFER SAFEGUARDS AGREEMENT AND NUCLEAR SAFEGUARDS (EU EXIT) REGULATIONS 2019

#### Voluntary Offer Agreement

3.1 The United Kingdom has negotiated 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.

3.2 This information predominantly takes the form of Accounting Reports as defined by Articles 60-66 of the VOA.

#### Accounting Reports

#### ARTICLE 60

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(a) *The United Kingdom shall provide the Agency with an initial report on all nuclear material in facilities or parts thereof on the Facilities List which is subject to safeguards under this Agreement. The initial report shall be despatched to the Agency within thirty days of the last day of the calendar month in which this Agreement enters into force, and shall reflect the situation as at the last day of that month.*

(b) *When facilities or parts thereof are added or restored to the Facilities List, the United Kingdom shall provide the Agency with an initial report on the nuclear material therein subject to safeguards under this Agreement. Such reports shall be despatched to the Agency within thirty days of the last day of the calendar month in which the facility or part thereof is added or restored to that List and shall reflect the situation as at the day on which it is added or restored.*

(c) *When any nuclear material becomes subject to safeguards under this Agreement as foreseen in Article 14, an inventory change report on such material shall be despatched to the Agency in accordance with Article 61(a).*

### ARTICLE 61

*The United Kingdom shall provide the Agency with the following accounting reports for each material balance area:*

(a) *inventory change reports showing all changes in the inventory of nuclear material. The reports shall be despatched as soon as possible and in any event within thirty days after the end of the month in which the inventory changes occurred or were established; and*

(b) *material balance reports showing the material balance based on a physical inventory of nuclear material actually present in the material balance area. The reports shall be despatched as soon as possible and in any event within thirty days after the physical inventory has been taken. The reports shall be based on the data available as of the date of reporting and may be corrected at a later date, as required.*

### ARTICLE 62

*Inventory change reports shall specify identification and batch data for each batch of nuclear material, the date of inventory change and, as appropriate, the originating material balance area and the receiving material balance area or the recipient. These reports shall be accompanied by concise notes:*

(a) *explaining the inventory changes, on the basis of the operating data contained in the operating records provided for under Article 56(a); and*

(b) *describing, as specified in the Subsidiary Arrangements, the anticipated operational programme, particularly the taking of a physical inventory.*

### ARTICLE 63

*The United Kingdom shall report each inventory change, adjustment and correction, either periodically in a consolidated list or individually. Inventory changes shall be reported in terms of batches. As specified in the Subsidiary Arrangements, small changes in inventory of nuclear material, such as transfers of analytical samples, may be combined in one batch and reported as one inventory change.*

### ARTICLE 64

*The Agency shall provide to the United Kingdom with half-yearly statements of book inventory of nuclear material subject to safeguards under this Agreement, for each material balance area, as based on the inventory change reports for the period covered by each such statement.*

### ARTICLE 65

*Material balance reports shall include the following entries unless otherwise agreed by the United Kingdom and the Agency:*

(a) *beginning physical inventory;*

(b) *inventory changes (first increases, then decreases);*

(c) *ending book inventory;*

(d) *shipper/receiver differences;*

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(e) *adjusted ending book inventory;*

(f) *ending physical inventory; and*

(g) *material unaccounted for.*

*A statement of the physical inventory, listing all batches separately and specifying material identification and batch data for each batch, shall be attached to each material balance report.*

### 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.*

- 3.3 As set out in Regulation 42 of NSR19 ONR have responsibility, on behalf of the United Kingdom, for providing timely and accurate Accounting Reports to the IAEA.
- 3.4 ONR obtain the information required for these Accounting Reports directly from UK operators as a result of the requirements placed on them by the NSR19.
- 3.5 In order to achieve sustained delivery of the obligation in the VOA, ONR need to undertake suitable and sufficient assessment of the information provided by UK operators prior to conversion to the required Code 10 Format prior to onward transmission to the IAEA.

This is achieved in large part by assessing Operator compliance with the corresponding NSR19 requirements.

### Nuclear Safeguards (EU Exit) Regulations 2019

- 3.6 NSR19 Regulations 12-16 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:

*12.— (1) An operator must provide the ONR with accounting reports in accordance with regulations 13 to 20 in respect of each material balance area.*

*(2) An operator must ensure that the accounting reports contain up to date information and must correct the information at a later date if necessary.*

*(3) On a written request by the ONR, an operator must supply further details, explanations amplifications or clarifications of any information set out in the relevant accounting report within the period of 15 days beginning with the day on which the operator receives the request from the ONR.*

#### *Initial book inventory*

*13. An operator of a qualifying nuclear facility must, within the period of 15 days beginning with commencement day, send to the ONR, an initial inventory of all the qualifying nuclear material in each material balance area of a qualifying nuclear facility on commencement day, using the format set out in Part 4 of Schedule 1.A*

#### *Inventory change report*

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14.— (1) For each material balance area, the operator must send to the ONR an inventory change report in respect of all qualifying nuclear material using the format set out in Part 2 of Schedule 1.

(2) Unless otherwise specified in the particular safeguard provisions imposed under regulation 5, the operator must send to the ONR an inventory change report within the period of 15 days beginning with the end of each month, in which the operator must state all inventory changes to the qualifying nuclear material which have occurred or become known to the operator during that month.

(3) In respect of any month in which a physical inventory is taken and the physical inventory taking date is not the last day of the month, the operator must send two separate inventory change reports to the ONR—

(a) a first inventory change report containing any inventory changes up to and including the date on which the physical inventory was taken, to be sent to the ONR with the physical inventory listing and the material balance report, which are referred to in regulation 15 and are to be sent to the ONR as soon as possible and at the latest within a period of 15 days beginning with the day on which the physical inventory was taken; and

(b) a second inventory change report, to be sent within a period of 15 days beginning with the end of the month in which the physical inventory was taken, containing all inventory changes from the first day after the physical inventory was taken up to and including the last day of the month.

(4) In respect of a month in which no inventory changes occur, when the operator sends the inventory change report to the ONR in accordance with paragraph (1), the operator must carry over the ending book inventory of the previous month.

(5) In order that they may be reported as a single inventory change, small inventory changes, such as transfers of samples for the purpose of analysis, may be grouped together, unless otherwise stated in the particular safeguard provisions for the relevant qualifying nuclear facility.

(6) Inventory change reports may include comments explaining the inventory changes

*Material balance report and physical inventory listing*

15.— (1) For each material balance area, the operator must send to the ONR—

(a) Material balance reports, in the format set out in Part 3 of Schedule 1, showing—

(i) The beginning physical inventory;

(ii) Inventory changes (first increases, then decreases);

(iii) Ending book inventory;

(iv) Ending physical inventory; and

(v) Material unaccounted for; and

(b) A physical inventory listing, in the format set out in Part 4 of Schedule 1, showing all batches separately.

(2) An operator must send the reports and the listing to the ONR as soon as possible and at the latest within the period of 15 days beginning with the day on which the physical inventory was taken.

*Special report*

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

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(2) *The ONR may—*

*(a) request further details or explanations in connection with a special report; and*

*(b) specify, in the particular safeguard provisions for a qualifying nuclear facility, additional requirements concerning the type of information to be supplied in a special report.*

*(3) If the ONR requests further detail or explanation in connection with a special report, the operator must send it to the ONR without delay*

#### 4. RELATIONSHIP TO ONR GUIDANCE FOR THE ASSESSMENT OF NUCLEAR MATERIAL ACCOUNTANCY CONTROL & SAFEGUARDS AND INTERNATIONAL STANDARDS

4.1 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 ONR Safeguards Inspectors and constitute safeguards relevant good practice.

ONMACS is guidance for inspectors, not a national policy document, and it provides ONR with a framework for making consistent regulatory judgments on the adequacy of operators' NMAC&S arrangements.

4.2 Sections of ONMACS will be of relevance to ONR inspectors when assessing operator accounting report submission, in particular;

MACE 7.2 Identification of Nuclear Material

MACE 8.2 Compilation of Nuclear Material Accounts Material.

MACE 9.1 On/Off Site Movements of Nuclear Material

MACE 9.3 Material Balance Evaluation

FSE 7 Nuclear Material Tracking	Identification of Nuclear Material	MACE 7.2
Operators must ensure that arrangements and procedures are in place to enable the unique identification of all nuclear material within the MBA.		

FSE 8 Data Processing and Control	Compilation of Nuclear Material Accounts	MACE 8.2
Operators should ensure that the appropriate arrangements and procedures are in place to ensure the effective management of their nuclear material accounts.		

FSE 9 Material Balance	On/Off Site Movements of Nuclear Material	MACE 9.1
Operators must ensure that the appropriate arrangements are in place to ensure that nuclear material shipped from sites and external receipts of nuclear material onto sites are controlled and subject to effective and robust NMACS arrangements that guarantee traceability		

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FSE 9 Material Balance	Material Balance Evaluation	MACE 9.3
Operators must ensure that where appropriate, arrangements are in place to ensure that Material Balance Evaluation (MBE) is carried out to determine if any non-zero inventory differences for can be explained by measurement uncertainty or reflects other causes.		

### 5. ADVICE TO INSPECTORS

5.1 Assessment is the act of making a judgment by the consideration of relevant evidence. The purpose of assessment is to allow ONR to reach an independent and informed judgement on the adequacy of an operator's submission. Assessment is used by ONR to determine whether the operator is, or will be, compliant with relevant legislation.

5.2 Due to the nature and type of information contained within accounting reports, the scope of NMA assessments are in some respects less flexible than other ONR assessment methodologies used for written operator submissions, NMA assessments must include 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.

SIMRS validation checks focus primarily on the prescriptive formatting requirements of accounting reports.

SIMRS does not make regulatory judgements on compliance, this is the responsibility of the inspector.

Assessment should be undertaken of both individual accounting reports, the collective set of reports that constitute a material balance period and longer periods of time to identify any trends or patterns in the data.

The assessment approach outlined may include verification that the accounting reports are substantiated by a set of underpinning operating and accounting records either during inspection activities or on request of the information by ONR.

Inspection in support of nuclear material accountancy assessment should be against a specific sample of the data contained in the operators accounting reports.

The Safeguards Technical Inspection Guide [5] provides additional information on undertaking of accountancy focused inspections.

#### Nuclear Material Accounting Report Assessment

5.3 Inspectors should assess compliance by comparing the 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.

5.4 All activities related to the assessment of the accounting reports should be captured by the inspector in an appropriate assessment record.

5.5 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.

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- 5.6 Inspectors should consider other relevant documents available to ONR to inform the assessment such as the Facility Attachment (FA), Basic Technical Characteristics (BTCs), Accountancy and Control Plans (ACPs), joint BEIS/ONR implementation guidance on new UK NCAs [6] or any Particular Safeguards Provisions (PSPs) made under regulation 5 of NSR19.

### Regulatory Requirements

The inspector should determine, inter alia, the following during assessment:

- a) that the accounting reports have been submitted in line with the timeliness requirement outlined within the NSR19 and that they cover the correct reporting period;
- b) that the accounting reports contain inventory data reported (as a minimum) to the nearest gram;
- c) that the accounting reports contain separate line entries for each category of qualifying nuclear material;
- d) whether all the requirements within a relevant PSP and / or FA have been complied with;
- e) that accounting reports contain appropriate reference to the country and location from, or to which qualifying nuclear material is received or shipped internationally;
- f) that appropriate reference is included to the material balance area from, or to which qualifying nuclear material is received or shipped domestically;
- g) that appropriate advance notification references are included when reporting international receipts or shipments to or from the material balance area;
- h) 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 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.

### Regulatory Expectations

The accounting reports should;

- a) be representative of the general facility type and more specifically, accurately reflect the BTCs declared for the MBA.
- b) cover the correct reporting period and in totality provide a continuous timeline for nuclear material accountancy within the material balance area.
- c) show that, for each material category and obligation arising from relevant international agreements (NSR19 Regulation 19), the book account inventory remains accurately reported in inventory change reports.
- d) show that, for each qualifying nuclear material category and obligation, the physical beginning and ending balances declared in the material balance report

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for the material balance period accurately reflect the inventory data reported in the corresponding physical inventory listings.

- e) show that, for each qualifying nuclear material category and obligation, the consolidated inventory change data declared in the material balance report accurately reflect the individual changes reported in the inventory change reports for the corresponding material balance period.
- f) with additional supporting information provided by an operator, show that, for each qualifying nuclear material category and obligation, the reported inventory change of material unaccounted for in the MBA is accurately reported and within the calculated Inventory Difference Action Level (IDAL).
- g) with additional supporting information provided by an operator, show that any reported shipper receiver differences (SRDs) are within tolerance of agreed action levels.
- h) contain accurate inventory data associated with accidental gains or losses of qualifying nuclear material as reconciled against a special report provided to ONR and that the associated special report reference is included within the "Comments" field of that associated reporting line.
- i) contain accurate inventory data associated with imports and exports of qualifying nuclear material as reconciled against advanced notifications provided to ONR.
- j) contain accurate inventory data associated with withdrawals of qualifying nuclear material from Safeguards as reconciled against an associated approved request received by ONR.
- k) contain accurate inventory data associated with termination of Safeguards on qualifying nuclear material
- l) be able to be substantiated against operator operating and accounting records (if requested by ONR) e.g. List of Inventory Items (LII), measurement data used for 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 error etc.

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**Official****6. REFERENCES**

1. Nuclear Safeguards (EU Exit) Regulations 2019 (NSR19)  
[http://www.legislation.gov.uk/ukdsi/2018/9780111175545/pdfs/ukdsi\\_97801111\\_75545\\_en.pdf](http://www.legislation.gov.uk/ukdsi/2018/9780111175545/pdfs/ukdsi_97801111_75545_en.pdf)
2. International Atomic Energy Agency, IAEA Safeguards Glossary, International Nuclear Verification Series No.3, IAEA, Vienna (2003)  
[https://www.iaea.org/sites/default/files/iaea\\_safeguards\\_glossary.pdf](https://www.iaea.org/sites/default/files/iaea_safeguards_glossary.pdf)
3. The Voluntary Offer Agreement (VOA), signed on 7th June 2018, between the United Kingdom and the International Atomic Energy Agency for the application of safeguards in the United Kingdom in connection with the Treaty on the Non- Proliferation of Nuclear Weapons  
<https://www.gov.uk/government/publications/ms-no132018-ukiaeaagreement-for-application-of-safeguards-in-connection-with-treaty-on-the-nonproliferation-of-nuclear-weapons>
4. ONR Guidance for Nuclear Material Accountancy, Control and Safeguards (ONMACS)
5. ONR Safeguards Technical Inspection Guidance
6. Nuclear Cooperation Agreements: Implementation Guidelines for Operators from 2021  
[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/916650/nuclear-cooperation-agreements-implementation-guidelines-for-nuclear-operators.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/916650/nuclear-cooperation-agreements-implementation-guidelines-for-nuclear-operators.pdf)

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**7. GLOSSARY AND ABBREVIATIONS**

AR	Assessment Report
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 Co-operation Agreements
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

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### 8. APPENDICES

#### APPENDIX 1: *Detailed expectations associated with Accounting Report Formats*

##### A1.1. General Expectations

###### Report and line numbering

All the 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.

Example: MBA QXXX reporting the February's ICR, and having a PIT at the 14 of 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

Each report is uniquely identified by the information contained in its header. All the reports of the same MBA or installation may be submitted in a single file. The order of the reports within the file can be random. The file should be named as follows:

MBA\_YYYYMM\_ReportType\_ReportNumber

MBA – The 4 letter MBA code for which the report covers

YYYYMM – The 4 digit year and two digit month

Report Type – The type of report being submitted e.g. I = ICR, P = PIL, M = MBR

Report Number – The Report number reported in the header of the report.

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### A1.2. Initial Book Inventory/Physical Inventory Listing

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 Number	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	R
11	Measurement	R	R	R	R
12	Element Category	R	R	R	R
13	Material Form	R	R	R	R
14	Material Container	R	R	R	R
15	Material State	R	R	R	R
16	Line Number	R	R	R	R
17	Item	R	R	R	R
18	Element Weight	R	R	R	R
19	Isotope	R	R	R	R
20	Fissile Weight	R	R	R	R
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

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**Official****A1.3. Inventory Change Report**Inventory Change Codes and Sign Convention

The element and isotope weights reported by the operator should be interpreted as positive or negative contributions to the nuclear materials balance depending on the inventory change (IC) Code declared, regardless of the sign declared by the operator.

Unless the IC Code allows both signs and, the weights will be considered as reported in the table below:

<b>IC code</b>	<b>Sign</b>
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
RB	Positive
BR / CR / PR / SR	Positive
NP	As Declared
NL	As Declared
NM	As Declared
DI	As Declared
BJ	As Declared
MF	As Declared
RA / R5	As Declared
MP	Positive
TU	Negative
BA	As Declared

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### 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) or preferred (P).

#### 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 Number	Label/Tag	Condition	Entry Status			
			New Entry	Lat e	Additi on	Dele te
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		R	R	R	R

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	Date					
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
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	P
36	Previous Report		N/A	R	R	P
37	Previous Line		N/A	N/A	R	P
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

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### A1.4. Material Balance Report

#### Material Balance Report Labels

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

#### 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	Start Report
5	End Report
6	Report Number
8	Line Count
9	Reporting person

#### Detail Lines

Field Number	Label/Tag	Entry Status			
		New Entry	Late	Addition	Delete
7	Element Category	R	R	R	R
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	P
17	Previous Report	N/A	R	R	P
18	Previous Line	N/A	R	R	P
19	Comment	O	O	O	O
20	CRC	N/A	R	R	P
21	Previous CRC	N/A	N/A	R	P

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### A1.5 Cyclic Redundancy Check (CRC) Algorithm

The algorithm for to be used when generating CRC entries within 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 <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32006H0040&from=EN>

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### APPENDIX 2: Policy and Relevant Good Practice Expectations

#### 2.1 De minimis reporting levels for QNM

Although no de minimis reporting level is defined in NSR 19, ONR recognise that there are concentrations or other threshold factors beyond which it is inappropriate and disproportionate to account for QNM.

These include where QNM is in the form of:

Uranium ores containing 0.1% or more uranium, thorium bearing ores containing 3% or more thorium, and monazites containing 10% thorium or 0.1% or more uranium;

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

- 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

Where sub-gram quantity items are held in discrete containers and which contain higher concentrations of qualifying nuclear material (e.g. metallic uranium or plutonium) than those listed above, the items should be accounted for, especially if there are a large number of such items. A proportionate approach to accounting for this material could be to aggregate such items and report them as a single batch with a number of items.

All qualifying nuclear material 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.

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### 2.2 Termination of Safeguards

#### Use of TE

When qualifying nuclear material 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 Material Balance Area.

#### Use of TU

The TU inventory 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 measured, or estimated on the basis of measurements. The quantity of QNM is to be removed from the inventory of the reporting material balance area.

The TU inventory change code should be used for reporting termination of QNM in the form of waste destined for final disposal at an appropriate location at concentrations not exceeding:

- 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

Use of the TU inventory change code for reporting termination of QNM in the form of waste destined for final disposal at an appropriate location above these concentrations should be agreed with ONR in advance

Use of the TU inventory change code for reporting termination of QNM incorporated in end products used for non-nuclear purposes should be agreed with ONR in advance.

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### 2.3 Withdrawals from Safeguards

Withdrawals of QNM from civil activities should be reported using the Inventory Change Code SN and have associated previous written consent of the ONR.

In line with previous UK policy commitments, Withdrawals of QNM from Civil Activities should only involve small quantities of qualifying nuclear material for use in instrument calibration or radiological detectors, or as analytical tracers or radiological shielding. Information on these withdrawals is published each year on the ONR website.

### 2.4 Correction Methods

If corrections to accounting reports are required, then they should be undertaken using the following methods only;

- Deleting a previous entry in an accounting report
- Correcting a previous entry in an accounting report by use of a Delete/Add pair
- Adding an entry to an accounting report by use of a Late Line

The corresponding codes Delete (D), Add (A) or Late (L) must be reported in the Correction field within the Accounting Report.

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.

For correction chains, the original date is always the accounting date of the first line in the chain.

For late lines (stand-alone additions), the original date is the date on which the inventory change occurred.

### 2.5 Advanced Notifications

An Advance Notification of imports and exports of QNM in excess of 1 effective kilogram is always required.

Where individual Imports or Exports of QNM do not exceed 1 effective kilogram, an Advanced Notification should be provided only if the cumulative total of transfers to another State is likely to exceed 1 effective kilogram during any consecutive 12 month period.

This determination should be made solely on imports and exports of QNM that do not exceed 1 effective kilogram. i.e. if an Advanced Notification has been provided for the export of QNM in excess of 1 effective kilogram to a State, Advanced Notifications are not automatically required for subsequent exports of less than 1 effective kilogram of QNM to the same state unless those specific exports are likely to exceed 1 effective kilogram during any 12 consecutive months.

Where an Advance Notification is provided, it should be appropriately referenced in the Accounting Reports.

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### 2.6 Nuclear Material Identification and Tracking

Batch identification within a PIL should be unique to the reporting MBA.

Batch identification should be unique to the reporting MBA for any transaction on a single date

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.

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.

### 2.7 Accidental Gains or Losses

#### Losses

Where QNM in item or bulk form is lost then it is to be reported as an accidental loss using the LA inventory change code in the next ICR.

A special report must be provided to ONR when reporting a LA. This should be referenced in the comments field of the ICR.

#### Gains

##### During routine operations

Where QNM in item or bulk form is found unexpectedly and unusually during routine facility operations then it is to be reported as an accidental gain using the GA inventory change code in the next ICR. Unless there is evidence that this qualifying nuclear material has been accounted for previously, the inventory change should not be included in consolidated figures for IDs.

A special report must be provided to ONR when reporting a GA. This should be referenced in the comments field of the ICR.

##### During POCO or Decommissioning

Where finds of QNM are expected from POCO or decommissioning then they may be declared as either a new measurement using the NM inventory change code in the next ICR or reported directly onto the next PIL as a new batch, use of this method will result in an explainable associated ID being reported in the MBR for that material balance period.

Where legacy QNM in item or bulk form of unknown origin (which cannot be traced to previous reporting) is found unexpectedly and unusually then it is to be reported as an accidental gain using the GA inventory change code in the next ICR

A special report must be provided to ONR when reporting a GA. This should be referenced in the comments field of the ICR

##### During Physical Inventory Taking

If material is found in the process of an inventory taking, then it is not considered an accidental gain. In such cases, the material is added to the physical inventory and the difference becomes a component of MUF.

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### 2.8 Special Reports

Where a Special Report is required to be reported by the operator in line with Regulation 16 of the NSR19, the minimum expectation on content is as follows:

- Date when the incident occurred and / or when the circumstances were established;
- A description of the actions taken in order to ascertain the cause of the incident or circumstances;
- The cause and features of the incident / circumstances;
- The estimated quantity and characteristics of any qualifying nuclear material which has been gained or lost.

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