



Accounting and Reporting of Nuclear Material

RD-336

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Accounting and Reporting of Nuclear Material
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Preface

Licensees possessing nuclear material (uranium, thorium, and plutonium) are required to report their holdings, and any inventory changes, to the Canadian Nuclear Safety Commission (CNSC). CNSC uses these reports to establish a national system of accounts for nuclear material. This system of accounts helps fulfill Canada's obligations pursuant to INFCIRC/164, *Agreement Between the Government of Canada and the International Atomic Energy Agency for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons*, related safeguards agreements, and Canadian bilateral nuclear cooperation agreements.

This regulatory document is issued to ensure consistency in record-keeping and reporting of these specific nuclear substances, in accordance with Canada's international obligations. It sets out the requirements for accurate and standardized accountancy of nuclear material inventories and describes the reporting requirements of nuclear material.

This regulatory document replaces AECB 1049/Rev.2 *Reporting Requirements for Fissionable and Fertile Substances*.

This document becomes effective January 1, 2011.

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ACCOUNTING AND REPORTING OF NUCLEAR MATERIAL

This document becomes effective January 1, 2011.

1.0 PURPOSE

This document sets out the requirements for the accurate and standardized accounting and reporting of data to the Canadian Nuclear Safety Commission (CNSC) related to uranium, plutonium, and thorium.

This document replaces AECB 1049/Rev.2 *Reporting Requirements for Fissionable and Fertile Substances*.

2.0 SCOPE

This document provides requirements for accounting and reporting of uranium, plutonium and thorium, hereafter referred to as nuclear material. For the purposes of this document, nuclear material includes natural uranium (including natural uranium ore and natural uranium ore concentrates), depleted uranium, enriched uranium, plutonium, and thorium. This document outlines the information needed to attain licensee uniformity in accounting records and reports of nuclear material.

These requirements or parts of these requirements apply to all Canadian licensees with safeguards conditions for possessing, using, or transferring nuclear material.

As specified in the body of this document, reporting requirements differ based on the type of nuclear material involved.

These requirements do not replace or remove the licensee's responsibility to provide any other reports or information as may be required by any CNSC regulation, licence condition, or other CNSC regulatory document.

The reports and request forms described in this document, and supporting information, can be found on CNSC Web site at www.nuclearsafety.gc.ca.

3.0 RELEVANT LEGISLATION AND OBLIGATIONS

3.1 Legislation

The following provisions of the *Nuclear Safety and Control Act* (NSCA; the Act) and regulations made under the NSCA are relevant to this regulatory document:

1. Paragraph 24(4)(b) of the NSCA states that "(4) No licence may be issued, renewed, amended or replaced unless, in the opinion of the Commission, the applicant

- (a) is qualified to carry on the activity that the licence will authorize the licensee to carry on; and
- (b) will, in carrying on that activity, make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed.”;
2. Paragraph 27(b) of the NSCA states that all persons licensed to carry on activities involving nuclear material shall submit to CNSC prescribed reports;
 3. Section 1 of the *General Nuclear Safety and Control Regulations* states that “safeguards agreement” means “(a) the *IAEA Agreement* and any arrangement between Canada and the IAEA made under that agreement”;
 4. Section 10 of the *General Nuclear Safety and Control Regulations* states that “Naturally occurring nuclear substances, other than those that are or have been associated with the development, production or use of nuclear energy, are exempt from the application of all provisions of the Act and the regulations made under the Act...”;
 5. Paragraph 12(1)(i) of the *General Nuclear Safety and Control Regulations* states that every licensee shall “take all necessary measures to facilitate Canada’s compliance with any applicable safeguards agreement”;
 6. Subsection 28(1) of the *General Nuclear Safety and Control Regulations* states that “Every person who is required to keep a record by the Act, the regulations made under the Act or a licence shall retain the record for the period specified in the applicable regulations made under the Act or, if no period is specified in the regulations, for the period ending one year after the expiry of the licence that authorizes the activity in respect of which the records are kept”; and
 7. Schedule Part A, Section 1 Controlled Nuclear Substances of the *Nuclear Non-proliferation Import and Export Control Regulations* defines “special fissionable material” and “source material”, for the purposes of licensing imports and exports.

3.2 International Atomic Energy Agency (IAEA) Safeguards Agreements

Canada has undertaken to comply with international obligations under the *Treaty on the Non-Proliferation of Nuclear Weapons* (NPT) and, through the agreements listed below, has undertaken to apply measures for the accounting for, and control of, nuclear material in Canada.

The agreements relevant to this regulatory document and which constitute “applicable safeguards agreement” as defined by CNSC *General Nuclear Safety and Control Regulations*, subsection 12(1), include, but are not limited to:

1. *Agreement between the Government of Canada and the International Atomic Energy Agency for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons*, IAEA INFCIRC/164, 1972; and

2. *Protocol Additional to the Agreement between Canada and the International Atomic Energy Agency for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons*, IAEA INFCIRC/164/Add.1, 2000.

These two agreements are referred to as the safeguards agreement in this document.

3.3 Bilateral Nuclear Cooperation Agreements

Canada has negotiated a number of bilateral Nuclear Cooperation Agreements (NCAs) with nuclear trading partners worldwide. The NCAs prescribe reciprocal conditions on the use of nuclear material that are assumed by the importing government. These conditions are provided in the non-proliferation policy requirements of the supplying government.

When nuclear material is transferred to Canada pursuant to the terms and conditions of an NCA, that nuclear material is subject to foreign obligations.

4.0 NUCLEAR MATERIAL CLASSIFICATION

4.1 General Information

To account for physical inventory and report inventory changes, the licensee is required to store nuclear material in Material Balance Areas (MBAs) such that:

1. The physical inventory of nuclear material can be determined when necessary, in accordance with specified procedures, so the material balance for IAEA safeguards purposes can be established; and
2. The quantity of nuclear material in each transfer into and out of MBAs can be determined.

Sections 5, 6, and 7 of this regulatory document outline the information that is required to be submitted to CNSC with respect to inventory and inventory changes.

Reporting requirements may differ for nuclear material according to the classification (called Groups) of nuclear material. Requirements for accounting and reporting are defined in this document under two material groups (Groups 1 and 2). Licensees may possess a combination of material groups; however each group must be physically segregated within an MBA.

4.2 Material Groups

4.2.1 Group 1

Group 1 nuclear material is uranium, plutonium, and thorium that has reached the stage in the nuclear fuel cycle where it has a composition and purity suitable for fuel fabrication or for isotopic enrichment.

In general, this material is possessed, under licence from CNSC, by refineries, conversion plants, fuel fabricators, power reactors, radioisotope processing facilities, research reactor and research establishments, and waste management and storage facilities.

4.2.1.1 Group 1A

Group 1A nuclear material is Group 1 nuclear material and requires detailed nuclear material accounting and reporting to CNSC.

Retained waste is specific type of Group 1A material that has been identified as unrecoverable and is subject to less stringent accounting and reporting requirements than other Group 1A nuclear material.

4.2.1.2 Group 1B

Group 1B nuclear material is Group 1 nuclear material that has been temporarily exempted by CNSC from detailed nuclear material accountancy. Annual reporting of inventories and locations of exempted nuclear material for Canada is required.

Exempted material must at some point be returned to Group 1A status (i.e., de-exempted and re-applied to safeguards) by the licensee by requesting de-exemption and obtaining approval from CNSC to re-apply the material to full reporting.

4.2.2 Group 2

Group 2 nuclear material is natural uranium and natural thorium (including ores and ore concentrates) that has not reached the stage in the nuclear fuel cycle when composition and purity is suitable for fuel fabrication or isotopic enrichment.

Generally, this material is possessed by mines, mills, concentration plants, and refineries under licence from CNSC.

5.0 GENERAL ACCOUNTING AND REPORTING REQUIREMENTS

All persons licensed to carry on activities involving nuclear materials shall maintain accounting records and provide such information to CNSC as required to facilitate Canada's compliance with any applicable safeguards or international agreement.

Aspects of nuclear material accounting may include: establishment of accounting areas, record-keeping, nuclear material measurement, preparation and submission of accounting reports, and verification of the correctness of the nuclear material accounting information.

5.1 Report Entries

All nuclear material accounting reports shall be prepared with licensee information from source records in the form of data elements that shall be identified by the use of standard codes specified by CNSC.

5.2 Weight Units and Rounding

Weight Units

Units for reporting of each material shall be in grams for enriched uranium (both element and isotope) and plutonium, and in kilograms for uranium and thorium concentrates, natural uranium and thorium, and depleted uranium. Quantities of nuclear material reported shall be reported to at least one decimal place to the right of the decimal point.

Rounding

Differences due to rounding must be minimised.

Individual weights shall not be rounded, but reported with their full numeric value, that is, the integer and decimal portions of the weights. The individual weights must be reported in the same way, to the same number of decimal places to the right of the decimal point for all reports pertaining to that reported weight.

When reporting weights for batches (groups of items), the total weight may be rounded only after summing the individual items with their full numeric value.

5.3 Reporting of Foreign Obligations

When nuclear material is imported into Canada under an NCA, it is deemed to be subject to foreign obligations. These foreign obligations include the requirement to track and report on nuclear material transferred to Canada subject to the NCA, and transferred within Canada. Nuclear material transferred subject to an NCA is identified as such by way of government-to-government communications.

In cases where nuclear material transferred to Canada is subjected to a bilateral NCA by the supplying country, CNSC informs the importer at the time an import licence is issued that the nuclear material is subject to foreign obligations. Foreign Obligation Codes are provided by CNSC on the import licence to assist the importer in tracking and reporting the obligation on that nuclear material to CNSC.

Any licensee who imports nuclear material is notified in writing by CNSC when a foreign obligation is attributed to the material. This is typically done at the time of issuance of an import licence by CNSC, but may occur at any other time. Where there has been no such notification by CNSC, the item or material in question may be considered unobligated.

When nuclear material is imported into Canada under a Nuclear Cooperation Agreement it is subject to foreign obligations. These foreign obligations include the requirement to track and report on the obligated material.

At the time an import/export licence is issued, CNSC informs the licensee, in writing, if the material is subject to foreign obligations. Foreign obligation codes are provided by CNSC on the import/export licence to assist in tracking and reporting the foreign obligation. This is typically done at the time of issuance of an import/export licence, but may occur at any other time. Where there has been no such notification by CNSC, the material in question may be considered unobligated.

5.4 Reporting of Corrections

Reporting a correction to a previously submitted report shall be done as soon as the error is realized by the licensee.

MBAs shall maintain their individual records using the “By-Difference Correction Principle” (BDCP). Using BDCP, accounting for corrections to data elements is based on the date when the correction is applied (not the date on which the original transaction occurred).

Corrections are to be reported only for the purpose of correcting a mistake to a data element(s) in a previously reported inventory change; they are not a means for reporting inventory changes.

6.0 NUCLEAR MATERIAL ACCOUNTING REPORTS

Accounting reports required to be maintained and submitted to CNSC are listed in the following table. Frequency for submission to CNSC is stipulated in Section 7.

**Table 6.1: Required Reports and Forms
for Accounting and Reporting Nuclear Material**

Inventory Change Document	6.1	√	√	√	√
General Ledger	6.2	√	Not Required	√	Not Required
Summary of Inventory Changes	6.3	√	Not Required	Not Required	Not Required
List of Inventory Items	6.4	√	Available on Request	√	Not Required
Physical-Key Measurement Point Inventory Summary	6.5	√	Not Required	√	Not Required
Obligated Material Inventory Summary	6.6	√	Not Required	Not Required	√
Reconciliation Statement	6.7	√	Not Required	√	Not Required
Request For Exemption	6.8.1	√	Not Applicable	Not Applicable	Not Applicable
Request For De-exemption	6.8.2	Not Applicable	Not Applicable	√	Not Applicable
Request for Termination of Safeguards	6.8.3	√	Not Applicable	Not Applicable	Not Applicable

6.1 Inventory Change Document

An inventory change is an increase or decrease of nuclear material in an MBA. Inventory changes of all nuclear material shall be reported to CNSC by the licensee on the Inventory Change Document.

An Inventory Change Document is used to report the data elements for the specific material batches undergoing the inventory change.

Increases to inventory that must be reported include:

1. Foreign receipts (imports);
2. Domestic receipts from other MBAs and starting point of safeguards;
3. Receipt of material at starting point of safeguards;
4. Production of special fissionable material in a reactor;
5. Retransfer from retained waste;
6. Re-application of safeguard on nuclear material previously exempted due to its use or quantity (de-exemption);
7. Accidental gain (inadvertent gain of nuclear material as the result of clean up); and
8. Other gains.

Decreases that must be reported include:

1. Foreign shipments (exports);
2. Domestic shipments to other MBAs and starting point of safeguards;
3. Decrease in nuclear material due to its transformation into other element(s) or isotope(s) as a result of nuclear reactions;
4. Nuclear material that has been measured, or estimated on the basis of measurements, and disposed of in such a way that it is not suitable for further nuclear use;
5. Transfer to retained waste, including nuclear material generated from processing or from an operational accident, which is deemed to be unrecoverable for the time being but is being stored;
6. Exemption of nuclear material from safeguards based on its use or quantity;
7. Termination of safeguards;
8. Accidental loss (irretrievable and inadvertent loss of nuclear material as the result of an operational accident); and
9. Other losses.

Other inventory changes that must be reported include:

1. Category changes;
2. Shipper/receiver differences;
3. Re-batching;
4. Transfers to and from permitted military use (with CNSC permission);
5. Rounding; and
6. Other monthly changes (e.g., re-packaging differences).

6.1.1 Requirements

The Inventory Change Document shall contain the following information:

1. The safeguards status of the material;
2. Shipper MBA;
3. Receiver MBA (if applicable; in some cases the shipper and receiver MBA are the same, for example, exemptions, terminations, measured discard, etc.);
4. Date of the inventory change or transfer, or correction to a previously-submitted inventory change, and receiving date if applicable;
5. Batch Name, Shipper's Batch Name, revision/correction #, and applicable CNSC export or import licence number;
6. Material Description Code(s) (MDC);
7. Material Batch Data, including the number of items, element/isotope codes, and weights;
8. Chemical and physical description as applicable to the MDC;
9. Country of origin of the material;
10. For each country of origin, identify the country or countries of obligation, as applicable, and the obligated weights for each element and isotope;
11. The Holding Account code to which an export is made, if applicable;
12. The name, address, and authorized signature of the licensee MBA initiating the Inventory Change Document;
13. When the inventory change is a transfer, the name, address, signature, and MBA code of the receiver; and
14. The applicable key measurement point, inventory change code, and measurement basis code for the material weights reported.

6.1.2 Reporting Rules

The Inventory Change Document reports only one inventory change code for one material batch, except in special accounting inventory changes as notified by CNSC.

For all imports of obligated material, receivers shall report obligated material information to CNSC via an Inventory Change Document, identifying the country(ies) by the foreign obligation country code(s) for each country of origin and the obligated material weights.

For all exports of obligated material, shippers shall report obligated material information to CNSC via an Inventory Change Document, identifying the country(ies) by the foreign obligation country code(s) for each country of origin and the obligated material weights.

If the nuclear material will not be subject to IAEA safeguards in the recipient country the shipper must submit to CNSC acknowledgement of receipt, obtained from the foreign receiver, no later than two months after receipt of the material by the recipient.

For all domestic transfers of obligated material, shippers shall report obligated material information to the receiver and to CNSC via an Inventory Change Document, identifying the country(ies) by the foreign obligation country code(s) for each country of origin and the obligated material weights. Once a shipper notifies a receiver that the transferred nuclear material has a foreign obligation, the receiver assumes responsibility for tracking and reporting on that obligation to CNSC.

Foreign obligations associated with the following inventory changes shall be reported to CNSC: Receipt Foreign, Receipt Domestic, Receipt at Starting Point, Nuclear Production, Shipment Foreign, Shipment Domestic, Nuclear Loss, and all Category Changes.

For retransfers of Group 1A nuclear material from a foreign holding account, an Inventory Change Document shall be prepared by the Canadian shipper and submitted to CNSC on the day of transfer out of the holding account.

All corrections to a previously-submitted inventory change shall also be reported on the Inventory Change Document as incurred.

6.2 General Ledger

A General Ledger is a monthly listing of all inventory changes that includes a running balance of the material in the MBA. It is a declaration by the licensee of what material should be in the MBA, based on accounting information. The General Ledger is used to determine the MBA book inventory.

6.2.1 Requirements

A General Ledger must be submitted for each element/isotope of Group 1 nuclear material. Separate ledgers must be submitted for Exempted Use (EU) and Exempted Quantity (Group 1B) material, as applicable.

The General Ledger for each MBA shall contain the following information:

1. The Material Group (1A or 1B) to which the report pertains, and if applicable, whether Exempted Use or Exempted Quantity;
2. Facility code, MBA code, element and isotope codes, reporting period, and signature;

3. An opening balance for the first day of the period, which is equal to the ending balance of the previous General Ledger;
4. Inventory changes including batch name and batch data (weight increases and decreases) that occurred and date corresponding to the Inventory Change Document issued during the report period;
5. A running cumulative balance;
6. Correction date if the transaction entry is a correction to an Inventory Change Document; and
7. The ending balance for the period.

6.2.2 Reporting Rules

The information for an inventory change recorded on the General Ledger must be consistent with information on the Inventory Change Document for each inventory change and date. The weights reported in the line entries of the General Ledger shall be exactly the same (value and decimals) as reported on the corresponding Inventory Change Document.

If a Physical Inventory Taking (PIT) is conducted on the last day of a reporting month, then only one General Ledger is required for that month. In all other cases when a PIT is conducted, two General Ledgers are required. The first general ledger reports transactions from the first day of the month up to and including 2400 hours of the date of the PIT. The second General Ledger reports transactions from the day after the PIT up to and including the last day of the month.

6.3 Summary of Inventory Changes

The Summary of Inventory Changes is a monthly summary of total balances for each inventory change type.

6.3.1 Requirements

A Summary of Inventory Changes report is required for each General Ledger reporting on Group 1A nuclear material. The Summary of Inventory Changes shall be prepared for each element/isotope of nuclear material.

The Summary of Inventory Changes report shall contain the following information:

1. Facility code, MBA code, element and isotope codes, and reporting period;
2. An opening balance for the first day of the period, which is equal to the opening balance of the corresponding General Ledger;
3. For each inventory change type reported during the month, the number of inventory changes that occurred during the period, weight increases, and decreases;

4. A sum total for weight increases and sum total for weight decreases; and
5. An ending balance for the period.

6.3.2 Reporting Rules

The information on the Summary of Inventory Changes must be consistent with the information on the General Ledger for the corresponding period.

To correspond with the General Ledger, a split (2-part) Summary of Inventory Changes report is required for a month in which PIT is conducted. The first Summary of Inventory Changes report includes transactions from the first day of the month up to and including 2400 hours of the date of the PIT. The second Summary of Inventory Changes report includes transactions from the day after the PIT up to and including the last day of the month.

6.4 List of Inventory Items

The List of Inventory Items is a listing of material items for each element/isotope category in each Group 1A or 1B nuclear material present in each Physical Key Measurement Point (P-KMP) of the MBA at the licensee's premises as of 2400 hours of the PIT date.

6.4.1 Requirements

The licensee shall submit a list of items for each material element present in the MBA at the time of a PIT.

The List of Inventory Items shall contain the following information:

1. The Material Group to which the report pertains;
2. Facility code, MBA code, element and isotope codes, reporting date of PIT, and signature;
3. For each data entry line of P-KMP, each data entry line of the List of Inventory Items must indicate the key measurement point where the material item resides, and stratum name of which the item is a part;
4. The Material Description Code (MDC) for each item;
5. Item identification, the number of items, and element/isotope weights; and
6. The measurement basis code and irradiation status (fresh or irradiated).

6.4.2 Reporting Rules

The List of Inventory Items includes individual items rather than batches. However, groups of items with the same MDC may be assigned one or more batch names.

6.5 Physical-Key Measurement Point (P-KMP) Inventory Summary

The P-KMP Inventory Summary (P-KMPIS) is a summary listing by P-KMP for each element/isotope material in the MBA at the time of a PIT of all batches of items contained in the List of Inventory Items. For licensees possessing small inventories, the List of Inventory Items may supply the required information for the P-KMPIS.

6.5.1 Requirements

The licensee shall produce a P-KMPIS from each List of Inventory Items of material present at the time of a PIT, and submit it to CNSC.

The P-KMPIS shall contain the following information:

1. The Material Group to which the report pertains;
2. Facility code, MBA code, element and isotope codes, reporting date of PIT, and signature;
3. For each P-KMP, the batch name;
4. The number of items contained in each batch;
5. The MDC for each item;
6. Element and isotope weights, as applicable; and
7. The measurement basis code and irradiation status (fresh or irradiated).

6.5.2 Reporting Rules

The List of Inventory Items reported in batches on the P-KMPIS shall have the same P-KMP, the same MDC, and the same irradiation status.

The P-KMPIS reported data must exactly match the batch totals of the List of Inventory Items.

6.6 Obligated Material Inventory Summary

The Obligated Material Inventory Summary (OMIS), submitted each year for each MBA, is a summary listing of Groups 1A and 2 nuclear material that have obligated conditions at the licensee's premises during the reporting period.

The licensee shall prepare an OMIS for the preceding calendar year and submit it to CNSC.

The OMIS shall contain the following information:

1. Facility code, MBA code, reporting period, and authorized licensee signature;
2. For each country of obligation, and for each element and isotope that has foreign obligations, the opening and ending balance weights; and

3. The sum total weights of the opening and ending balances for each element and isotope, within the reporting period.

6.7 Reconciliation Statement

A Reconciliation Statement is a report balancing (reconciling) the differences between material balances derived from the accounting records (i.e., General Ledger) and the balances derived from physical inventory taking of each element/isotope residing at the MBA, at the time of a PIT.

6.7.1 Requirements

The Reconciliation Statement shall include the following information, indicating the following for each category of nuclear material:

1. Safeguards status of the material;
2. Facility code, MBA code, element and isotope codes, and reporting date of PIT;
3. Book adjusted ending;
4. Physical ending;
5. Inventory Difference [book adjusted ending minus physical ending]; and
6. MBA Operator's printed name and signature, and date of signature.

6.7.2 Reporting Rules

An updated Reconciliation Statement must be completed and submitted to CNSC if there are any changes made to the Reconciliation Statement or to the List of Inventory Items and P-KMP Inventory Summary (P-KMPIS) reports, as a result of a Physical Inventory Verification or any other audit of the MBA.

Any resulting non-zero inventory difference must be reported to CNSC on an Inventory Change Document.

6.8 Request Forms for Re-disposition of Nuclear Material

Under certain circumstances, in order to comply with the safeguards agreement, the status of the nuclear material must be changed. Licensees must request approval for re-disposition of the material by completing the appropriate request form and submitting it to CNSC.

Re-disposition of Group 2 nuclear material is not applicable.

6.8.1 Request for Exemption

The Request for Exemption provides information about the nuclear material, its location(s), and intended use. This information forms the basis of the submission to the IAEA for approval to exempt from detailed nuclear material accountancy.

Licensees must submit a request to CNSC for an exemption for use or for quantity.

6.8.1.1 Requirements

The Request for Exemption shall include the following information:

1. Facility name and address, MBA code, and contact name, telephone, and fax numbers;
2. Reference to the article in the Safeguards Agreement INFCIRC/164 under which the exemption is requested, based on either:
 - a) Use (article 36a, 36b, or 36c); or
 - b) Quantity (article 37);
3. Reason for exemption of the material;
4. Intended use of the exempted material;
5. Element and isotope of the nuclear material to be exempted;
6. Element weight in the required units (grams or kilograms) and, for enriched uranium, the isotope weight in grams;
7. Present physical and chemical form of the material to be exempted, material description code (Label 430), and batch name;
8. Physical form and chemical form of the material, and the material description code (Label 430) as it will be in its intended exempted form;
9. Approximate date the exemption is to become effective;
10. If the material will be physically moved out of the MBA, the date and location where the exempted material will be transferred;
11. Destination of exempted material; and
12. Licensee authority name, signature, and date.

6.8.1.2 Reporting Rules

The Request for Exemption applies to all Group 1A materials, except for Retained Waste.

6.8.2 Request for De-exemption

A de-exemption is an application to return to full accountancy reporting. Licensees must submit a request to CNSC for de-exemption for use or for quantity.

6.8.2.1 Requirements

The Request for De-exemption shall include the following information:

1. Facility name and address, MBA code, and contact name, telephone, and fax numbers;
2. Reference to the article in the Safeguards Agreement INFCIRC/164 under which the original exemption was granted;
3. Batch name of material as originally exempted;
4. Original Exemption Request Identifier, if known;
5. Location from where the exempted material was transferred;
6. Reason for de-exemption of the material;
7. Element and isotope of the nuclear material to be de-exempted;
8. Element weight in the required units (grams or kilograms) and, for enriched uranium, the isotope weight in grams;
9. Present physical and chemical form of the material to be de-exempted, material description code (Label 430), and batch name;
10. Date from which safeguards should be reapplied; and
11. Licensee authority name, signature, and date.

6.8.2.2 Reporting Rules

The Request for De-exemption is applicable to Group 1B materials only.

Exempted nuclear material must be de-exempted prior to exporting, irradiating, or storing with other nuclear material.

6.8.3 Request for Termination of Safeguards

Accounting and control should be terminated on nuclear material when it is determined that the material has been consumed or has been diluted in such a way that it is no longer usable for any nuclear activity or has become, in practice, irrecoverable.

The Request for Termination of Safeguards provides information about the nuclear material, its location(s), and intended non-nuclear use. This information forms the basis of the submission to the IAEA for approval to terminate from IAEA safeguards.

Licensees must request a termination of safeguards from CNSC.

6.8.3.1 Requirements

The Request for Termination of Safeguards form shall contain the following information:

1. Facility name and address, MBA code, and contact name, telephone, and fax numbers;
2. Reference to the article in the Safeguards Agreement INFCIRC/164 under which the termination is requested;
3. Reason for termination of the material;
4. Element and isotope of the nuclear material to be terminated;
5. Element weight in the required units (grams or kilograms) and, for enriched uranium, the isotope weight in grams;
6. Present physical and chemical form of the material to be terminated, material description code (Label 430), and batch name;
7. Present use and particulars of containment (if applicable);
8. Proposed non-nuclear use;
9. How the material will be, in practice, irrecoverable;
10. Approximate date of transfer to non-nuclear use;
11. Location of non-nuclear use;
12. Approximate date of transfer out of MBA (if applicable); and
13. Licensee authority name, signature, and date.

6.8.3.2 Reporting Rules

The Request for Termination from Safeguards applies to Group 1A materials only.

7.0 REPORTING FREQUENCY FOR NUCLEAR MATERIAL

The following table details the reporting frequency for the required reports and forms that must be submitted to CNSC.

Table 7.1: Reporting Frequency

Reports and Request Forms	RD-336 Section	Reporting Frequency		
		Group 1		Group 2
		1A	1B	
Inventory Change Document	6.1	Next business day following transaction	Next business day following transaction	Next business day following transaction
General Ledger	6.2	By the 7 th business day after the end of the reporting month	Upon request by CNSC	Not required
Split General Ledger	6.2	First report: by the 7 th business day after a Physical Inventory Taking (PIT), is conducted.	Upon request by CNSC	Not required
		Second report: by the 7 th business day after the end of the reporting month	Upon request by CNSC	
Summary of Inventory Changes	6.3	Required with every corresponding General Ledger	Not required	Not required
Split Summary of Inventory Changes	6.3	Required with every corresponding split General Ledger in month of a PIT	Not required	Not required
List of Inventory Items	6.4	Required seven business days after a PIT (for retained waste, upon request by CNSC)	Annually and upon request by CNSC	Not required
P-KMP Inventory Summary	6.5	Required with the corresponding List of Inventory Items above	With the List of Inventory Items above (this and the List of Inventory Items may be the same report)	Not required
Obligated Material Inventory Summary	6.6	Annually on Jan 31 st and upon request by CNSC	Not required	Annually on Jan 31 st and upon request by CNSC
Reconciliation Statement	6.7	Required by the 7 th business day after a PIT ¹	Not required	Not required

Reports and Request Forms	RD-336 Section	Reporting Frequency		
		Group 1		Group 2
		1A	1B	
Request For Exemption	6.8.1	CNSC approval required prior to exempting any material from safeguards	Not applicable	Not applicable
Request For De-exemption	6.8.2	Not applicable	CNSC approval required prior to reapplying any material to safeguards ²	Not applicable
Request for Termination of Safeguards	6.8.3	CNSC approval required prior to terminating any material from safeguards	Not applicable	Not applicable

¹Following an audit or a Physical Inventory Verification (PIV), the licensee must make any required adjustments to the original List of Inventory Items and P-KMP Inventory Summary, recalculate the physical endings of the affected elements/isotopes as applicable, and revise the Reconciliation Statement. All reports must be submitted to CNSC within one business day after an audit or PIV.

²Not required when nuclear material is temporarily shipped out of Canada for a short period of time subject to conditions identified for exempted material transfers.

8.0 ACCOUNT AUDITS

Licensees of nuclear material are subject to account audits by CNSC and the IAEA. During these account audits, the licensee must provide access to all records, reports, and source documents and provide explanations with regard to the accounts, when requested.

GLOSSARY

Accounting

A system of records and reports that shows, for each MBA, the inventory of nuclear material and the changes in that inventory including receipts into and transfers out of the material balance area.

Account Audit

An examination by IAEA or CNSC inspectors of the nuclear material accounts, records, and reports at a facility to check for completeness, correctness, internal consistency, and consistency with the State Reports.

Accounting records

A set of data kept at each facility or location outside facilities showing the quantity of each category of nuclear material present, its distribution within the facility and any changes affecting it. Accounting records contain in respect of each MBA:

1. All inventory changes, so as to permit a determination of the book inventory at any time;
2. All measurement results that are used for determination of the physical inventory; and
3. All adjustments and corrections that have been made in respect of inventory changes, book inventories, and physical inventories.

Batch

A portion of nuclear material handled as a unit for accounting purposes at a key measurement point. The composition and quantity are defined by a single set of specifications (material description code) or measurements (concentration, enrichment). The nuclear material may be in bulk form or contained in a number of separate items.

Items included in a batch must contain nuclear material of the same element concentration and enrichment. Items of different material description codes must be reported as separate batches.

Batch data

The total weight of each element of nuclear material and its isotopic composition as applicable.

Book adjusted ending

The algebraic sum of the beginning physical inventory and of the inventory changes over the period, adjusted to take into account shipper-receiver differences.

Book inventory

The algebraic sum for a given point in time of the most recent physical inventory of a Material Balance Area and all inventory changes that have occurred since that physical inventory was taken.

Bulk form (ref. Batch)

Material in bulk form such as a liquid, gas, powder, pellets, or pebbles, that is not individually identified for accounting purposes. Bulk form material may be contained in a tank, drum, tote, or box.

By-Difference Correction Principle (BDCP)

The procedure by which a correction to an inventory change data element in a report is applied within the material balance period in which the change is dated. The weight difference between the original record and the correcting record is recorded in the accounts (i.e., General Ledger) as of the date the correction to the inventory change is realized and recorded.

Category change

A change in one of the three categories of uranium: depleted uranium, natural uranium, and enriched uranium. Uranium can change category as a result of blending, enrichment, depletion or burn-up. For example, natural uranium can become depleted uranium as a result of the burn-up of uranium-235. Category change results in the reduction of one category of uranium and a corresponding increase in another.

Concentrate

An extracted product, containing uranium or thorium, resulting from the physical or chemical separation from ore.

Correction

Entry into an accounting record or a report to rectify an identified mistake or to reflect an improved measurement of a quantity previously entered into the record or report.

Country of origin

Country of origin is identified as the country where the nuclear material was mined.

Country of supply

Country of supply is identified as the country from where the nuclear material was shipped prior to entering Canada.

Data element

Unit of information in the Material Balance Area records.

Depleted uranium

Uranium that contains uranium-235 in a concentration of less than 0.7%, which is less than that normally found in nature.

Effective kilogram

A unit of measurement used in accounting and reporting of safeguarded nuclear material:

Element	Enrichment	Effective Kilogram
Uranium	enrichment of 1 percent and higher	weight in kilograms multiplied by the square of its enrichment
Uranium	enrichment less than 1 percent and more than 0.5 percent	weight in kilograms multiplied by 0.0001
Depleted uranium	enrichment of 0.5 percent or less	weight in kilograms multiplied by 0.00005
Plutonium	not applicable	weight in kilograms
Thorium	not applicable	weight in kilograms multiplied by 0.00005

Enriched uranium

Uranium having a higher abundance of the fissile isotopes [uranium-235, uranium-233, or a combination of both] than natural uranium.

Exempted material

Any nuclear material that was initially classified as Group 1A and has been granted a temporary classification to Group 1B. The material remains classified as Group 1B until it is re-classified to Group 1A. Material may be exempted on the basis of non-nuclear use or by quantity less than 1 effective kilogram.

Facility

A reactor, critical facility, conversion plant, fabrication plant, reprocessing plant, isotope separation plant, or a separate storage installation; or any location where nuclear material in amounts greater than one effective kilogram is customarily used.

Fertile material

Nuclear material that can be converted into a special fissionable material through the capture of one neutron per nucleus. There are two naturally occurring fertile material, uranium-238 and thorium-232. Through the capture of neutrons followed by two beta decays, these fertile materials are converted to fissionable plutonium-239 and uranium-233, respectively.

Foreign obligations

When nuclear material is imported into Canada under a NCA, it is deemed to be subject to foreign obligations.

Foreign obligations include, among other conditions, the requirement to track and report on nuclear material transferred to Canada subject to an NCA, and transferred within Canada. Nuclear material transferred subject to an NCA is identified by way of government-to-government communications. In cases where nuclear material transferred to Canada is made subject to a bilateral NCA by the supplying country, CNSC informs the importer at the time an import licence is issued that the nuclear material is subject to foreign obligations.

The country of foreign obligation is not necessarily the country of origin or of supply. The countries of obligation, origin, and supply may all be different. For a given quantity of nuclear material, there may be a single country of obligation, multiple countries of obligation, or no foreign obligation. Material that has no specified obligations is referred to as unobligated.

Holding account

A holding account is a holding area at an identified foreign facility to which unallocated Canadian-origin nuclear material can be exported and temporarily held pending the conclusion of a commercial arrangement for nuclear material held in the account.

Inventory change

An increase or decrease of nuclear material, in terms of batches, in a Material Balance Area.

Inventory difference

The difference between book adjusted inventory and the physical inventory as reported in the reconciliation statement. (also known as Material Unaccounted For (MUF)).

Item

Individually identifiable units of nuclear material, for example, a fuel assembly, or material in bulk form in a container, such as a tank or box, that are kept intact while stored in the Material Balance Area.

Key measurement point (KMP)

A location in a MBA where nuclear material is processed or stored. A physical KMP is a storage location where the quantity of the material can be determined. A flow KMP is a place where the movement of the material is determined.

Label

Unique three or four digit numbers used to clearly identify information in nuclear material accountancy.

Location outside facilities (LOF)

Any installation or location, which is not a facility, where nuclear material is customarily used in amounts of one effective kilogram or less and is subject to full nuclear material accounting and reporting.

Material Balance Area (MBA)

An area within a facility or a location outside of a facility (LOF) such that:

1. The quantity of nuclear material in each transfer into and out of the area can be determined; and
2. The physical inventory of nuclear material in each material balance area can be determined when necessary, in accordance with specified procedures, so the material balance for IAEA safeguards purposes can be established.

Material balance period

The time between two consecutive physical inventory takings.

Material category

For the purpose of nuclear material accounting, element material categories are: natural uranium, depleted uranium, enriched uranium, thorium, and plutonium. Isotope material categories are: uranium-235, uranium-233, and plutonium-239.

Material Description Code

A four character code used to describe nuclear material batches by physical form, chemical composition, containment or type of container and irradiation status and quality.

Measurement basis code (also measurement identification code)

The data element for the method used to measure or determine the weight or mass data of a nuclear material element and isotope.

The Measurement Basis (MB) code indicates whether the weight data was determined in the current MBA or another MBA and whether the data was new or previously reported.

Natural uranium

Uranium that contains the isotope uranium-235 in a concentration that is normally found in nature.

Non-safeguarded material

Source material and special fissionable material under IAEA safeguards [Agreement INFCIRC/164] that has not reached the stage of the nuclear fuel cycle as described in article 34 (c).

Nuclear loss

Loss of nuclear material due to its transformation into other element(s) or isotope(s) as a result of nuclear reactions. Nuclear loss also includes burn-up of nuclear material in a reactor and decay (e.g., plutonium-241) during storage.

Nuclear material

For the purposes of this document, nuclear material includes natural uranium, depleted uranium, enriched uranium, plutonium, and thorium.

Material within the scope of this document requiring reporting to CNSC includes all material under the Canada/IAEA safeguards agreement. Group 1 is nuclear material that is safeguarded under the Canada/IAEA safeguards agreement, article 34 (c). Group 2 is source material excluding both ore residues and depleted uranium.

Nuclear production

The generation of special fissionable material through the irradiation of fertile material in a reactor.

Obligations

See *Foreign obligations*

Operator

The person or organization responsible for the nuclear inventory.

Ore

A mineral or chemical aggregate containing uranium [or thorium] in a quantity and of a quality that makes mining and extracting the uranium [or thorium] economically viable.

Physical ending

The sum of all measured and derived batch/item quantities of nuclear material on hand at the date of the physical inventory taking (i.e., the total of the List of Inventory Items).

Physical inventory

The sum of all the measured or derived estimates of batch quantities of nuclear material at a given time within a MBA obtained in accordance with the licensees' [CNSC-approved] program and procedures.

Physical inventory verification (PIV)

An inspection activity that follows closely, or coincides with, the Physical Inventory Taking by the operator and closes the material balance period. The basis for Physical Inventory Verification is the List of Inventory Items prepared by the operator.

Re-batching

Accounting for changes to the physical inventory (e.g., chemical and physical form, irradiation status) of an individual batch of nuclear material.

Retained waste

A subset of Group 1A, retained waste is nuclear material that has been identified as unrecoverable and is stored in the MBA. This nuclear material can be transferred to retained waste upon approval of CNSC staff. After transfer, the only reporting requirement is to provide an inventory listing upon request.

Safeguarded nuclear material (Group 1 nuclear material)

Source material and special fissionable material under IAEA Safeguards (Agreements INFCIRC/164, Subsidiary Arrangements, and Additional Protocol INFCIRC/164/Add 1) that has reached the stage of the nuclear fuel cycle, as described in Article 34 (c), that it is suitable for fuel fabrication or for isotopic enrichment. In Canada, this is uranyl nitrate. Further to Article 34 (c), nuclear material at or beyond this stage of the fuel cycle is subject to all safeguards procedures specified in the safeguards agreement.

Shipper/receiver difference

The difference between the quantities of nuclear material in a batch as stated by the shipping material balance area and as measured at the receiving MBA.

Source material

Uranium containing the mixture of isotopes occurring in nature; uranium depleted in the isotope 235; thorium; any of the foregoing in the form of metal, alloy, chemical compound, or concentrate. Ore concentrate is considered to be source material. For the purposes of this document, the term source material is not interpreted as applying to ore or ore residue.

Special fissionable material

Group 1 nuclear material that contains plutonium-239, uranium-233, uranium enriched in the isotopes 235 or 233, and any material that contains any of the foregoing. The term special fissionable material does not include source material.

Starting point of safeguards

The starting point of IAEA safeguards under the Canada/IAEA Safeguards Agreement is:

1. When any nuclear material of a composition and purity suitable for fuel fabrication or for isotopic enrichment leaves the plant or the process stage in that it has been produced; and
2. When such nuclear material, or any other nuclear material produced at a later stage in the nuclear fuel cycle, is imported into Canada.

In Canada the starting point of IAEA safeguards is the introduction of uranium ore concentrate feed from a mill or imported and processed into uranyl nitrates at a refinery. The IAEA safeguards under the Canada/IAEA Safeguards Agreement do not apply to material in mining or ore processing activities.

Stratum

A grouping of items and/or batches having similar physical and chemical characteristics. For example, items maybe grouped according to isotopic composition in order to facilitate statistical sampling.

Transfers

Any movement of nuclear material, both domestic (between Canadian MBAs) and foreign (imports and exports).

Weight data

The numeric label and the element or isotope weight of an item or batch of nuclear material.

ADDITIONAL INFORMATION

The following documents contain additional information that may be of interest to persons involved in the accounting and reporting of nuclear material:

1. International Atomic Energy Agency, *Agreement between the Government of Canada and the International Atomic Energy Agency for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons*; IAEA INFCIRC/164, 1972
2. International Atomic Energy Agency, *Protocol Additional to the Agreement between Canada and the International Atomic Energy Agency for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons*, IAEA INFCIRC/164/Add 1, 2000.
3. International Atomic Energy Agency, *IAEA Guidelines for State System of Accounting for and Control of Nuclear Materials*. International Nuclear Verification Series, INFCIRC/2 1980, 2006.
4. International Atomic Energy Agency, *IAEA Safeguards Glossary 2001 Edition*, International Nuclear Verification Series 3, 2001.