(2) Timely detection of the possible abrupt loss of five or more formula kilograms of SSNM from an individual unit process;

(3) Rapid determination of whether an actual loss of five or more formula kilograms occurred;

(4) Ongoing confirmation of the presence of SSNM in assigned locations; and

(5) Timely generation of information to aid in the recovery of SSNM in the event of an actual loss.

(b) *System capabilities.* To achieve the general performance objectives specified in §74.51(a), the MC&A system must provide the capabilities described in §§74.53, 74.55, 74.57 and 74.59 and must incorporate checks and balances that are sufficient to detect falsification of data and reports that could conceal diversion by:

(1) An individual, including an employee in any position; or

(2) Collusion between an individual with MC&A responsibilities and another individual who has responsibility or control within both the physical protection and the MC&A systems.

(c) *Implementation dates.* Each applicant for a license, and each licensee that, upon application for modification of a license, would become newly subject to paragraph (a) of this section, shall submit a fundamental nuclear material control (FNMC) plan describing how the MC&A system shall satisfy the requirement of paragraph (b) of this section. The FNMC plan shall be implemented when a license is issued or modified to authorize the activities being addressed in paragraph (a) of this section, or by the date specified in a license condition.

(d) *Inventories.* Notwithstanding §74.59(f)(1), licensees shall perform at least three bimonthly physical inventories after implementation of the NRC approved FNMC Plan and shall continue to perform bimonthly inventories until performance acceptable to the NRC has been demonstrated and the Commission has issued formal approval to perform semiannual inventories. Licensees who have prior experience with process monitoring and/or can demonstrate acceptable performance against all Plan commitments may request authorization to perform semiannual inventories at an earlier date.

[52 FR 10040, Mar. 30, 1987, as amended at 63 FR 26963, May 15, 1998; 67 FR 78148, Dec. 23, 2002]

§74.53 Process monitoring.

(a) Licensees subject to §74.51 shall monitor internal transfers, storage, and processing of SSNM. The process monitoring must achieve the detection capabilities described in paragraph (b) of this section for all SSNM except:

(1) SSNM that is subject to the item loss detection requirements of §74.55;

(2) Scrap in the form of small pieces, cuttings, chips, solutions, or in other forms that result from a manufacturing process, held in containers of 30 gallons or larger, with an SSNM content of less than 0.25 grams per liter;

(3) SSNM with an estimated measurement standard deviation greater than five percent that is either input or output material associated with a unit that processes less than five formula kilograms over a consecutive three-month period; and

(4) SSNM involved in research and development operations that process less than five formula kilograms during any seven-consecutive-day period.

(b) *Unit process detection capability.* For each unit process, a licensee shall establish a production quality control program capable of monitoring the status of material in process. The program shall include:

(1) A statistical test that has at least a 95 percent power of detecting an abrupt loss of five formula kilograms within three working days of a loss of Category IA material from any accessible process location and within seven calendar days of a loss of Category IB material from any accessible process location;

(2) A quality control test whereby process differences greater than three times the estimated standard deviation of the process difference estimator and 25 grams of SSNM are investigated; and

(3) A trend analysis for monitoring and evaluating sequences of material control test results from each unit process to determine if they indicate a pattern of losses or gains that are of safeguards significance.

(c) For research and development operations exempt from the requirements of paragraph (b) of this section, the licensee shall:

(1) Perform material balance tests on a lot or a batch basis, as appropriate, or monthly, whichever is sooner, and investigate any difference greater than 200 grams of plutonium or U–233 or 300 grams of U–235 that exceeds three times the estimated standard error of the inventory difference estimator;

(2) Evaluate material balance results generated during an inventory period for indications of measurement biases or unidentified loss streams and investigate, determine the cause(s) of, and institute corrective action for cumulative inventory differences generated during an inventory period that exceed three formula kilograms of SSNM.

§ 74.55 Item monitoring.

(a) Licensees subject to § 74.51 shall provide the detection capability described in paragraph (b) of this section for laboratory samples containing less than 0.05 formula kilograms of SSNM and any uniquely identified items of SSNM that have been quantitatively measured, the validity of that measurement independently confirmed, and that additionally have been either:

(1) Tamper-safed or placed in a vault or controlled access area that provides protection at least equivalent to tamper-safing; or

(2) Sealed such that removal of SSNM would be readily and permanently apparent (e.g., encapsulated).

(b) The licensee shall verify on a statistical sampling basis, the presence and integrity of SSNM items. The statistical sampling plan must have at least 99 percent power of detecting item losses that total five formula kilograms or more, plant-wide, within:

(1) Thirty calendar days for Category IA items and 60 calendar days for Category IB items contained in a vault or in a permanently controlled access area isolated from the rest of the material access area (MAA);

(2) Three working days for Category IA items and seven calendar days for Category BI items located elsewhere in the MAA, except for reactor components measuring at least one meter in length and weighing in excess of 30 kilograms for which the time interval shall be 30 calendar days;

(3) Sixty calendar days for items in a permanently controlled access area outside of an MAA; or

(4) Sixty calendar days for samples in a vault or permanently controlled access area and 30 calendar days for samples elsewhere in the MAA for samples each containing less than 0.05 formula kilograms of SSNM.

(c) Items containing scrap in the form of small pieces, cuttings, chips, solutions, or in other forms that result from a manufacturing process, held in containers of 30 gallon or larger, with an SSNM concentration of less than 0.25 grams per liter are exempt from the requirements of paragraph (b) of this section.

§ 74.57 Alarm resolution.

(a) Licensees subject to § 74.51 shall provide the MC&A alarm resolution capabilities described in paragraphs (b) through (f) of this section.

(b) Licensees shall resolve the nature and cause of any MC&A alarm within approved time periods.

(c) Each licensee shall notify the NRC Operations Center by telephone of any MC&A alarm that remains unresolved beyond the time period specified for its resolution in the licensee's fundamental nuclear material control plan. Notification must occur within 24 hours except when a holiday or weekend intervenes in which case the notification must occur on the next scheduled workday. The licensee may consider an alarm to be resolved if:

(1) Clerical or computational error is found that clearly was the cause for the alarm; or

(2) An assignable cause for the alarm is identified or it is substantiated that no material loss has occurred.

(d) If a material loss has occurred, the licensee shall determine the amount of SSNM lost and take corrective action to:

(1) Return out-of-place SSNM, if possible, to its appropriate place;

(2) Update and correct associated records; and

(3) Modify the MC&A system, if appropriate, to prevent similar future occurrences.