

THE PENNSYLVANIA STATE UNIVERSITY

207 OLD MAIN BUILDING
UNIVERSITY PARK, PENNSYLVANIA 16802

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Vice President for
Research and Graduate Studies

15 Feb 83

Director of Nuclear Material Safety
and Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Re: License No. 37-00185-04
30-982 37-00185-05
30-7059 37-00185-06
30-10645 SNM-95
PA-100

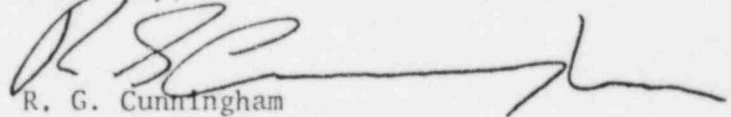
Gentlemen:

This is to notify you of changes in the membership of the University Isotopes Committee and the "Rules and Procedures for the Use of Radioactive Material at the Pennsylvania State University".

1. R. E. Pilgram, M. D. has retired from the University and has been replaced by Floyd Naugle, M.D. as a member of the University Isotope Committee. Dr. Naugle is a physician at the Ritenour Health Center, Pennsylvania State University, University Park, PA. He has had no previous experience handling radioactive material, but he attended the REAC/TS conference, The Medical Basis for Radiation Accident Preparedness, 18-20 Oct 79, at Oak Ridge, Tenn. and received instruction in the biological effects of radiation while a flight surgeon in the U.S. Navy.
2. Section 21, Special Nuclear Material Control Procedures, of the "Rules and Procedures for the Use of Radioactive Material at the Pennsylvania State University" has been revised. A copy of the revision, with the changes marked, is enclosed. These changes were primarily made to make the procedures consistent with the recent changes in reporting forms for special nuclear material. Changes were also made to consolidate material balance areas and remove the names of individuals from the rules and procedures.

Please feel free to contact the University if you need further information about the above.

Sincerely,



R. G. Cunningham
Vice President for Research and Graduate
Studies

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cc: W. W. Pratt
R. W. Granlund
John Glenn, Region I, Nuclear Regulatory Commission
Donald McDonald, Bureau of Radiation Protection
Pennsylvania Department of Environmental Resources

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Section 21

SPECIAL NUCLEAR MATERIAL CONTROL PROCEDURES

21.1 This section describes the procedures for the control of special nuclear material. The procedures are designed to provide a record of the receipt, use, disposal, or transfer of special nuclear material (SNM) and to detect the loss, theft, or unauthorized use of such material. Terms and abbreviations used in this procedure are defined as follows:

- a) Item Control Area (ICA): an identifiable physical area where the control of SNM into or out of the area is by item identity and count for previously determined SNM quantities, the validity of which shall be assured by the use of tamper-safe seals unless the items are sealed sources.
- b) Material Balance: a determination of material unaccounted for (MUF) or inventory difference (ID) made by subtracting ending inventory (EI) plus removals (R) from the beginning inventory (BI) plus additions to inventory (A).
*
*
$$\text{MUF (or ID)} = \text{BI} + \text{A} - \text{EI} - \text{R}.$$
- c) Material Balance Area (MBA): an identifiable physical area for the physical and administrative control of SNM such that the quantity of SNM moved into or out of the MBA is represented by a measured value.
- d) Material Balance Area Controller (MBA Controller): the individual with the responsibility for maintaining the inventory and control of all items within a given MBA.
- e) Special Nuclear Material (SNM): plutonium, uranium 233, uranium enriched in the isotope 233 or the isotope 235, or
* any material artificially enriched in the foregoing but does not include source material.

21.2 Orders for SNM are to be processed in the same manner as orders for other radioactive material (see section 16). All shipments of radioactive material and SNM for the University Park Campus are to be delivered to the Health Physics Office. Prior arrangements

should be made with the Health Physics Office for the receipt of material at other campuses to insure that the package is properly checked. Arrangements may also be made with the Health Physics Office to receive material at other locations on the University Park campus or by persons other than the health physics staff when necessary. The persons accepting delivery of a package shall inspect it for damage and check the serial numbers of security seals against the shipping orders. Any damage to the package or missing or damaged seals should be noted on the shipping orders. If a person other than a representative of the Health Physics Office is accepting the shipment, that office shall be notified immediately of any damage to the package or seals. The exterior of the package should be checked according to section 17. Packages are to be opened by or under the supervision of a health physics staff member unless prior arrangements have been made with the Health Physics Office for someone else to do this. A physical inventory of the material is to be made at the same time and the inventory form completed (form HP-30 or HP-30S). Upon completion of the procedures for receipt of the material the package will be delivered to the authorized user at the appropriate MBA.

- 21.3 Special nuclear material is to be stored and used according to the authorization issued by the UIC or according to the reactor operating license for material included within that license. Material may not be transferred between MBA's or from one user to another until authorization to do so has been received from the UIC. Unsealed SNM in quantities greater than 10 grams is to be stored in a secure area with some form of tamper-safe security seal and access should be restricted to those persons named on the UIC authorization for the material. Irradiated materials which require storage in the reactor pool or in a shielded enclosure are exempt from the requirement for tamper-safe seals. One person is to be designated the MBA Controller for each MBA. That person is responsible for maintaining an inventory of SNM in the MBA and for keeping a record of any transfers or loss of material. Persons authorized to use SNM within a MBA are responsible for notifying

the MBA Controller of any removals, additions, transfers, or losses of SNM.

21.4 *The UIC shall identify the boundaries of Material Balance Areas and Item Control Areas and shall designate the MBA Controllers for each **area. The current Material Balance Areas are listed below. There are no Item Control Areas.

	<u>CODE</u>	<u>LOCATION</u>	<u>MBA CONTROLLER</u>
**	MBA-I	University Park Campus	Senior Reactor Operator in charge of reactor operations
**	MBA-II	Room 201A, Science Building 1, Altoona Campus	Authorized user of Pu-Be source

21.5 Transfers include receipts, shipments to other licensees, movement between MBA's, and transfers between authorized users. New material will be assigned to a MBA and an authorized user upon receipt. Any subsequent changes in authorized user or MBA require completion of the Special Nuclear Material Transfer Form. This form is to be completed by the person initiating the transfer and signed by the authorized user(s), the MBA Controller(s), and a representative of the Health Physics Office. Copies of the completed form are to be distributed to each of the above named individuals.

21.6 *Transfers of SNM between different NRC licensees require completion of DOE/NRC Form 741, the Nuclear Material Transaction Report. Transfers of certain other nuclear materials, including deuterium, normal and depleted uranium, californium and enriched lithium may also require completion of DOE/NRC Form 741. This form is to be prepared by the Health Physics Office for signature by the Vice President for Research and Graduate Studies. Current regulations require that a licensee supplying nuclear materials prepare and dispatch DOE/NRC Form 741 no later than one working day following shipment of the material. A licensee receiving nuclear materials is permitted 10 calendar days after arrival of the material in which to document its receipt by completion of the receiver's section of the form. Individuals supplying materials covered by these reporting requirements to other licensees and those receiving such materials from other licensees are responsible for providing the Health Physics Office with the information necessary to complete and submit DOE/NRC Form 741 within the specified time limits. Distribution of this form is to be made in accordance with instructions contained in NUREG/BR-006 or DOE Notice 5630 for privately-owned and DOE-owned nuclear materials, respectively.

- 21.7 A physical inventory shall be conducted of the SNM in each MBA at intervals not to exceed 12 months. The inventory shall be initiated by the Health Physics Office and shall be conducted by at least two individuals, including the MBA Controller or his designate and a member of the Health Physics staff. The inventory shall consist of a visual examination and actual measurement of quantities of unsealed SNM. Material which has been previously measured and continuously maintained under tamper-safe seal need not be remeasured unless the seal has been broken or damaged. Material which has been irradiated and requires shielded storage or containment because of the radiation or contamination hazard need not be visually inspected or measured, but the presence of the storage container or irradiation vessel must be verified. Each item or container of SNM, except fuel elements, shall be identified by a tag which indicates that the item is SNM and includes the item description, isotope, quantity, inventory number, authorized user, authorization number, license number, date, and initials of the person completing the tag. The tag should be attached directly to the item or item container.
- 21.8 Tamper-safe seals are to be applied immediately upon completion of the operations which establish the SNM content of an item. Serial numbers of seals are to be recorded and checked at the next inventory or when the container is next opened. More than one individually packaged item may be stored in a container such as a metal box or vault under the same seal. Seals are to be stored in a locked container accessible to only the MBA Controller and/or the University Health Physicist. The selection and use of security seals should follow the recommendation in NRC Regulatory Guides 5.10 and 5.15. It is recommended that small items of unsealed SNM be kept in transparent containers with the gross weight and net weight recorded in the inventory so that the material can be visually checked and the amount readily determined by weighing the container, if necessary.
- 21.9 Sealed sources of SNM such as fuel elements, fission counters, and neutron sources need not be assayed, but serial numbers or other identification should be checked. When the number of similar items exceeds 25 a random sampling of at least 10% of the items (but not less than 10) may be made to check identifying numbers.

- 21.10 The inventory information shall be recorded on a written form and signed and dated by the persons conducting the inventory. The same form may not be used for more than one day or for more than one MBA. Copies of the inventory form shall be distributed to the MBA Controller and the Health Physics Office. The physical inventory shall be compared with the inventory record and documented by the MBA Controller.
- 21.11 A review of this procedure and an audit of the material balance for each MBA shall be conducted at intervals not to exceed 12 months. The review shall be conducted by person(s) who are independent of nuclear control responsibility and who do not have direct responsibility for receipt, custody, use or measurement of SNM. The person(s) to conduct the audit and review shall be designated by the Vice President for Research and Graduate Studies with the concurrence of the UIC. The results of the audit and review and any recommendations for improvements shall be documented and reported to the UIC and the Vice President for Research and Graduate Studies.
- 21.12 *The University is required to submit quarterly Material Balance Reports (DOE/NRC Form 742) for several categories of DOE-owned nuclear materials to the Chicago Operations Office of the Department of Energy. These reports are to be filed within 10 days of the end of each calendar quarter (31 March, 30 June, 30 September and 31 December). Semiannual material balance reports covering DOE-owned SNM as well as privately-owned SNM also must be submitted to the Nuclear Material Control site at Oak Ridge within 30 days following the end of the period covered by the reports (31 March and 30 September). These reports shall be prepared by the Health Physics Office for submission by the Vice President for Research and Graduate Studies. Each MBA Controller is responsible for providing the Health Physics Office with a material balance for the SNM in his area as of the above dates in sufficient time for the preparation and submission of these reports. Fission and transmutation losses in reactor fuel shall be calculated as described below.

a) The Burn-Up Log, which is kept by the Breeseale Nuclear Reactor, contains the power level and duration of each reactor run on a daily basis. The number of kilowatt hours of operation for each month are totaled from the daily data. A cumulative total of all kilowatt hours to date is also kept on a monthly basis in the Burn-Up Log.

b) Compute total Burn-Up (B) by multiplying the kWh for each month and the total to date by 4.32×10^{-5} grams burn-up/kWh.

$$B \text{ (grams)} = 4.32 \times 10^{-5} \times \text{kWh.}$$

c) Compute the grams of uranium lost (U) by multiplying the burn, B, by 1.077. $U(\text{grams}) = 1.077 \times B.$

d) Compute the grams of uranium-235 lost ($U-235_1$) by multiplying the burn-up, B, by 1.192.

$$U-235 \text{ (grams)} = 1.192 \times B.$$