Summary of the Nature of Departures from Radiopharmaceutical Package Inserts Made by Medical Licensees

P-32	Used for indication which was not included in the package insert; indication defined as over production of blood platelets
Xenon-133	Dissolved in saline solution

Technetium-99m

Cardiolite	Used activity greater than the package insert maximum for preparation
	Volume greater than suggested in package insert
Ceretec	Used for labeling leukocytes (not specified in the package insert)
DTPA	Used for gastric emptying (not specified in the package insert)
	Used activity greater than the package insert maximum for preparation
	Extended expiration time beyond that indicated in the package insert
MDP	Used activity greater than the package insert maximum for preparation
	Added ascorbic acid
MAA	Used activity greater than the package insert maximum for preparation
	Extended expiration time beyond that indicated in the package insert
Oxidionate	Extended expiration time beyond that indicated in the package insert

67FR

Enclosure III A

A11

Summary of the Nature of Departures from Radiopharmaceutical Package Inserts Made by Medical Licensees

PYP	Used procedures not specified in the package insert: 1. Washed PYP labeled erythrocytes with saline solution and/or 2. Heat damaged PYP labeled erythrocytes
Sodium Pertechnetate	Extended expiration time beyond that indicated in the package insert
Sulfur Colloid	Filtered prior to use (not specified in the package insert) Extended expiration time beyond that indicated in the package insert Dosage greater than suggested in package insert

Representative Examples Providing
the Nature of Departures from
Radiopharmaceutical Package Inserts
Made by Commercial Nuclear Pharmacies

Enclosure III B

Syncor Kit Prep Guidelines

TABLE 1: Tc99m MACROAGGREGATED ALBUMIN

MANUFACTURER	November 1989 Kit Prep Guidelines			Package Insert Recommendations		
	Activity[1]	Tc99m Volume	Time of Use[2]	Activity[3]	Tc99m Volume	Time of Use[2]
DuPont (3.6 - 6.5M Particles)	125 mCi	2-8 ml	12 hours	72 mCi	2-8 ml	6 hours
CIS (12 - 15M Particles)	340 mCi	3-5 ml	12 hours	240 mCi	3-5 ml	6 hours
Squibb (2 - 7M Particles)	115 mCi	1-3 ml	12 hours	40 mCi	1-3 ml	6 hours
Medi+Physics (1.5 - 2.5M Particles)	50 mCi	up to 3 ml	12 hours	80 mCi (4 - 8M Particles)	2-8 ml	6 hours
Mallinckrodt (4 - 12M Particles)	200 mCi	5-10 ml	12 hours	80 mCi	5-10 ml	discard vial after 8 hrs

[1] Amounts used in November 1989 guidelines for MAA based on 200,000 particles per 5 mCi dose, and average number of particles per vial at time ofpreparation. These values may be increased to account for decay up to the time of calibration of the dispensed dose.

[2] Do not exceed the expiration time of the sodium pertechnetate elution used to prepare the kit.

[3] Activity is based on 200,000 particles per 4 mCi dose, and minimum number of particles per vial at time of preparation. Activity may be increased to account for decay up to the time of calibration of the first dispensed dose.

TABLE 2: Tc99m BONE IMAGING AGENTS

PRODUCT	November 1989 Kit Prep Guidelines			Package Insert Recommendations		
	Activity[1]	Tc99m Volume	Time of Use[2]	Activity[1]	Tc99m Volume	Time of Use[2]
Squibb MDP	400 mCi	0.5-5 ml	12 hours[3]	150 mCi	0.5-5 ml	12 hours[3]
Medi+Physics MDP	400 mCi	2-8 ml	12 hours	400 mCi[4]	2-8 ml	6 hours
DuPont MDP	200 mCi	2-8 ml	6 hours	200 mCi[5]	2-8 ml	6 hours
CIS MDP	200 mCi	1-8 ml	6 hours	200 mCi[6]	1-8 ml	6 hours
Amersham MDP	100 mCi	1-8 ml	6 hours	100 mCi	1-8 ml	6 hours
Mallinckrodt HDP	150 mCi		6 hours	150 mCi[7]	3-6 ml	6 hours[8]
DuPont PYP	200 mCi	3-7 ml	6 hours	200 mCi	3-7 ml	6 hours
Squibb PYP	75 mCi	2-4 ml	6 hours	75 mCi	2-4 ml	6 hours
Mallinckrodt	100 mCi	1-10 ml	6 hours	100 mCi	1-10 ml	6 hours

[1] These activities are maximum amounts and lesser amounts should be used as experience dictates.

[2] Do not exceed the 12 hour expiration time of the sodium pertechnetate elution used to prepare the kit.

[3] Recommended time of use is not specified in the manufacturer's instructions.

[4] Maximum activity is not specified by the manufacturer. Syncor policy limits activity to 400 mCi.

[5] Maximum activity is not specified by the manufacturer. Syncor policy limits activity to 200 mCi.

[6] The manufacturer specifies maximum activity of 300 mCi, but Syncor policy limits it to 200 mCi.

[7] The manufacturer specifies maximum activity of 200 mCi, but Syncor policy limits it to 150 mCi.

[8] Manufacturer's instructions recommend an 8 hour time of use, but Syncor policy limits it to 6 hours.

TABLE 3: Tc99m DTPA

- November 1989 Kit Prep Guidelines/ -
Package Insert Recommendations

Procedure	Manufacturer	Activity	Tc99m Volume	Time of Use
Brain Scan	Squibb	300 mCi	up to 5 ml	6 hours
Renal Scan	Squibb	300 mCi	up to 5 ml	4 hours[2]
Ventilation Study	Squibb	300 mCi	up to 5 ml	6 hours
GFR Assessment[3]	Squibb	50 mCi	2-5 ml	1 hour
Brain Scan	Medi+Physics	300 mCi[2]	2-8 ml	6 hours
Renal Scan	Medi+Physics	300 mCi[2]	2-8 ml	6 hours
Ventilation Study	Medi+Physics	300 mCi[2]	2-8 ml	6 hours
GFR Assessment[3]	Medi+Physics	50 mCi	2-8 ml	1 hour
Brain Scan	CIS	100 mCi[2]	2-3 ml	2 hours[2]
Renal Scan	CIS	100 mCi[2]	2-3 ml	2 hours[2]
Ventilation Study	CIS	100 mCi[2]	2-3 ml	2 hours[2]
GFR Assessment[3]	CIS	50 mCi[2]	2-3 ml	1 hour

Do not exceed the 12 hour expiration time of the sodium pertechnetate elution used to prepare the kit.

Syncor guidelines are more restrictive than manufacturers' instructions.

Syncor experience shows that Medi+Physics DTPA is preferred for GFR assessment.

TABLE 4: Tc99m GLUCOHEPTONATE

Procedure	Manufacturer	Activity (- November 1989 Kit Prep Guidelines/ - Package Insert Recommendations)	Tc99m Volume	Time of Use[1]
Brain Scan	DuPont	150 mCi[2]	3-7 ml	6 hours
Renal Scan	DuPont	150 mCi[2]	3-7 ml	4 hours[2]

[1] Do not exceed the 12 hour expiration time of the sodium pertechnetate elution used to prepare the kit.

[2] Syncor guidelines are more restrictive than manufacturers' instructions.

TABLE 5: Tc99m HUMAN SERUM ALBUMIN

Procedure	Manufacturer	------ November 1989 ------ Kit Prep Guidelines Activity	Tc99m Volume	Time of Use[1]	----- Package Insert ----- Recommendations Activity	Tc99m Volume	Time of Use[1]
Multidose	Medi+Physics	200 mCi	3 ml	6 hours	100 mCi	3 ml	6 hours
Unit Dose	Medi+Physics	70 mCi	1.3 ml	6 hours	30 mCi	1.3 ml	3 hours

[1] Do not exceed the 12 hour expiration time of the sodium pertechnetate elution used to prepare the kit.

TABLE 6: Tc99m HEPATOBILIARY LIVER AGENTS

Product	Manufacturer	------ November 1989 ---- Kit Prep Guidelines			----- Package Insert ----- Recommendations		
		Activity	Tc99m Volume	Time of Use[1]	Activity	Tc99m Volume	Time of Use[1]
Cholotec	Squibb	200 mCi	2-5 ml	18 hours[2]	100 mCi	1-5 ml	18 hours
Hepatolite	DuPont	150 mCi	2-5 ml	8 hours	100 mCi	4-5 ml	6 hours
Microlite	DuPont	75 mCi	2-8 ml	6 hours	75 mCi	2-8 ml	6 hours
Sulfur Colloid	CIS	500 mCi	1-3 ml	12 hours	500 mCi	1-3 ml	6 hours
Sulfur Colloid	Mallinckrodt	400 mCi	0.1-5 ml	12 hours	400 mCi	0.1-5 ml	discard vial after 6 hrs.
Sulfur Colloid	Squibb	500 mCi	0.1-5 ml	12 hours	500 mCi[3]	0.1-5 ml	6 hours
Sulfur	Medi+Physics	400 mCi	0.5-5 ml	12 hours	400 mCi	0.5-5ml	6 hours

[1] Do not exceed the 12 hour expiration time of the sodium pertechnetate elution used to prepare the kit.

[2] Preservative in formulation allows 18 hour expiration time specified in package insert. Tc99m must have Mo99 concentration within acceptable limits as of expiration time.

[3] Manufacturer's instructions do not specify maximum activity. Syncor policy limits activity to 500 mCi.

TABLE 7: OTHER Tc99M IMAGING AGENTS

Product	Manufacturer	- November 1989 Kit Prep Guidelines/ - Package Insert Recommendations[1] Activity	Tc99m Volume	Time of Use[2]
DMSA	Medi+Physics	44-88 mCi	2.2 - 4.4 ml 2.2 ml reagent	30 minutes
HM-PAO (Ceretec®)	Amersham	30 mCi[3]	up to 5 ml	30 minutes

[1] Syncor Guidelines correspond to manufacturers' instructions.

[2] Do not exceed 12 hour expiration time of the sodium pertechnetate elution used to prepare the kit.

[3] Sodium pertechnetate elution must be less than 2 hours old when used to prepare the kit.

To: Kamal Amin, Syncor, Inc.
Re: Preparation of Technetium 99m HMPAO--Labeled Leukocytes

Dear Mr. Amin:

This to authorize Syncor to prepare Technetium 99m HMPAO--labeled leukocytes for use by the Nuclear Medicine Service, Department of Radiology at Akron General Medical Center, Akron, Ohio.

These labeled leukocytes will be used for imaging patients with suspected infection, such as osteomyelitis. Use of this product is indicated as a substitute for 111-in leukocytes because of increased resolution of Technetium 99m and reduced radiation dose to the patient, particularly the spleen.

Use was approved at the Radiation Saftey Committee meeting held in July, 1991. This authorization is made pursuant to CFR 35.200 (c)(1).

Dr. Richard Albright,
Director, Department of Nuclear Medicine
Akron General Medical Center

Post-it™ brand fax transmittal memo 7671	# of pages ▸ 1
To JAMES CAMPEN	From SYNCOR INC GOV
Co. NRC	Co.
Dept	Phone #
Fax # 79-790-5665	Fax # 216 753 04 50

MALLINCKRODT
Nuclear Medicine

January 23, 1992

Mr. Robert Ellis
Nuclear Medicine Dept.
Lutheran Medical Center
2639 Miami St.
St. Louis MO 63118

Mallinckrodt Medical, Inc.
Diagnostic Imaging Services
1827 Bob Wey Drive
St. Louis, Missouri 63114
Telephone (314) 427-1555
Facsimile (314) 427-3163

Copy
1-28-92
Original sent to Mallinckrodt on 1-31-92
B2

Dear Mr. Ellis,

Recently the NRC has become interested in the issue of nuclear pharmacists compounding Tc-99m technetium radiopharmaceutical kits using parameters other than those stated in the product's package insert. The NRC is allowing nuclear pharmacies to amend their licenses under 10 CFR Part 30.34 to deviate from the package insert guidelines only if it can be demonstrated that the product quality is not compromised. The Mallinckrodt DIS pharmacy currently prepares your radiopharmaceuticals slightly different than the conservative manufacturers' package insert guidelines. (For specific changes, see attached sheet.) These changes are consistent with current standards of nuclear pharmacy practice, and quality assurance procedures are performed daily. Until the necessary license amendment is submitted, the NRC is requesting that Mallinckrodt have on file at the nuclear pharmacy a signed authorization from the prescribing physician (M.D. authorized user) for radiopharmaceutical compounded outside the parameters stated in the package insert.

In order to remain in regulatory compliance with 10 CFR Part 35, we ask you to sign and return the attached authorization form indicating your approval for radiopharmaceutical kit preparation consistent with current standards of nuclear pharmacy practice. As always, Mallinckrodt is committed to excellence in nuclear medicine and the safety and well-being of your patients. Enclosed are two copies of the authorization form. Keep one copy for your records and return the other copy to Mallinckrodt in the enclosed self-addressed stamped envelope.

Please contact me if you have questions regarding this request or would like to discuss any portion of the current regulations.

Sincerely,

Jack Martin

Jack Martin, R.Ph., BCNP
Facility Manager

Enclosures

MALLINCKRODT MEDICAL, INC.
ST. LOUIS DIS

RADIOPHARMACEUTICAL PREPARATION GUIDELINES						
RADIOPHARMACEUTICAL NAME	PACKAGE INSERT			MMI-DIS PHARMACY		
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Tc-99m SULFUR COLLOID	500	6	MM	500	12	--
Tc-99m MAA	60	6	MM	150	10	--
Tc-99m MDP	200	6	MM	325	8	3mg ascorbic acid
Tc-99m DTPA	180	6	CR	300	10	3mg ascorbic acid
Tc-99m GLUCEPTATE	300	6	MM	300	8	--
Tc-99m PYP	100	6	MM	300	7	--
Tc-99m HDP	200	6	MM	285	9	--
Tc-99m MAG3	100	6	MM	100	10	--
Tc-99m HSA	100	6	MR	175	8	--
Tc-99m Na PERTECHNETATE	--	12	MM	--	24	--

Note: All other radiopharmaceutical kits are prepared according to manufacturer package insert guidelines.

PHYSICIAN AUTHORIZATION

I hereby grant approval for Mallinckrodt pharmacists to exercise their professional judgement in the preparation of radiopharmaceutical kits consistent with the standards of practice of nuclear pharmacy as detailed under MMI-DIS pharmacy preparation guidelines on this page.

Hospital Name: LUTHERAN MEDICAL CENTER

Physician Signature: Brian McCann MD

Date: JAN 28 1992

Departure Requests

Enclosure IV

DEPARTURE FROM MANUFACTURERS INSTRUCTIONS
TECHNETIUM 99m SESTAMIBI

The instructions for Cardiolite, the Technetium Sestamibi product of Dupont calls for the addition of 25-150 mCi of technetium to the supplied vial. After discussion with a number of centers using the Sestamibi agent, it is quite apparent that over 200 mCi of technetium can be instilled into the vial without degrading the tagging of the tracer.

The cost for Technetium Sestamibi per patient is determine by the number of patient doses obtained per vial. By increasing the technetium placed in the vial from 150 to 225 mCi and to a volume of 4 ccm, it is possible to cut the cost of the material substantially resulting in a health care benefit to the general population. Consequently, I am recommending a departure from the package insert with an allowance for up to 225 mCi and 4 cc of technetium to be instilled per vial of Sestamibi.

DEPARTURE FROM PACKAGE INSERT
P-32 THERAPY FOR THROMBOCYTOSIS

Intravenous aqueous P-32 has been shown repeatedly to be of benefit for patients with overproduction of blood cells by the bone marrow. It is one of the major treatments given for patients with polycythemia vera, for whom the other therapies include phlebotomy and chemotherapy.

In some patients the only overproduced element is the blood platelet. For these individuals phlebotomy is not a therapeutic option but P-32 has proven to be of great benefit. Consequently, as a principle user of therapeutic radionuclides at The Williamsport Hospital & Medical Center, I authorize the use of therapeutic aqueous P-32 for this indication.

6-12-91

WRITTEN DIRECTIVE FOR DEVIATION FROM MANUFACTURER'S INSTRUCTIONS FOR A RADIOPHARMACEUTICAL

Date: January 3, 1992

Patient Name: SEE LIST

Patient SSN: SEE LIST

Specific Nature of the Departure:

This is a written directive to deviate from the manufacturer's instructions concerning the amount of activity that will be added to all Cardiolite kits.

Precise Description of the Departure:

When reconstituting Cardiolite kits, add a total activity of 300 mCi to each kit instead of the recommended 25-150 mCi. All other parameters including volume of reconstitution, expiration time, and method of quality control will be performed as instructed by the manufacturer.

Reason for the Departure:

This deviation will allow us to obtain more patient doses from one vial. Therefore, the benefit to the patient is in terms of cost savings. Since there are no effects on product quality, radiation dosimetry to the patient, or any other test parameters, additional risks to the patient as a result of this deviation are nonexistent.

Andrew J. Pinchuk M.D. F.A.C.N.M.P.H.

Authorized User Physician Signature

DOCUMENTATION OF DEVIATION FROM PRESCRIBED DOSE AS PER PACKAGE INSERTS:

SCAN: Sipenol Ventriculogram (Flow study)

PATIENT: Helen Turek PHYSICIAN: Yuri Tsu DATE: 12-21

ADMINISTERED DOSE: 14 mCi Tc^{99}-3 Teslued (Sulfur Colloid)

CLINICAL INDICATOR: R/O Obstructive Pancreatic CA ± hematosis

DEVIATION FROM SUGGESTED DOSE PER THIS RADIOPHARMACEUTICAL PACKAGE INSERT

+ 5 (mCi) uCi

- ____ mCi uCi

Circle

Michael T. Czuba, M.D., RSO

7/01/91
Revised 8/01/91

EXEMPTION TO PACKAGE INSERT FOR SAME DAY STUDIES USING TECHNETIUM 99M CARDIOLITE

Sestamibi (Cardiolite) is a new technetium based compound for myocardial perfusion imaging. Technetium energy and lack of significant redistribution make this an ideal perfusion imaging agent particularly for use with SPECT imaging. However, one of the major advantages of this new compound is that it allows first pass evaluation of left ventricular function both at rest and stress providing significant important prognostic and diagnostic information in addition to the perfusion image with the same injection of radiotracer at the same dosimetry. This is one of the major advantages leading to its utilization at the Medical College of Virginia and partially justifies its marked increase in expense. However, unlike Thallium-201, it does not redistribute and two injections of tracer are required either on the same day or on separate days. To perform quality, valid first pass studies the bolus must not exceed 0.5cc and the smaller the bolus, the better. In the case of two day studies adequate specific activity to allow this is not problematic; however, in the single day protocol preferred by both patients and referring physicians, a low dose (10mCi) rest study is followed by a high dose (30mCi) stress study performed several hours later.

The vendor permits six doses per vial with a shelf life of six hours following preparation; however, the package insert recommends 1 to 3 milliliters of volume containing 25 to 150mCi. In order to perform same day studies with first pass on three patients (6 injections) which is the minimum feasible number considering the cost, the recommendation is not cogent. A minimum of volume of 2ml is necessary to provide the six injections and to provide adequate activity for the 30mCi late doses at the shelf life projected by the vendor would require that the initial activity be 120mCi per milliliter. Therefore for same day studies with Cardiolite it is necessary to prepare kits with up to 250mCi in a vial with a volume not to exceed 2.5ml. With this exemption alterations in QC will be performed to ensure the stability of the compound before being injected. Although the initial QC will be performed as recommended a second QC will be performed prior to the late injections of the tracer (ie., the second stress high dose injections) and at the expiration of the kit.

The following exemption appears reasonable and in the best interest of providing quality patient care. Single day first pass rest/stress studies are optimal for providing the maximum information for the dose administered. It should be noted <u>the patient dose has not been changed and is within the recommended guidelines of the package insert.</u> There is no evidence to support that this change in kit preparation changes either the stability or binding efficiency of the compound in any way and that the limitations are primarily of commercial origin. We have observed

no problems with stability or binding in kit preparations in which doses have exceeded that suggested. In addition, QC will be strictly followed so as to detect any change in binding efficiency or stability and kits will not be used where the QC degrades by 5% or greater from the initial QC or if any of the QC's exceed that recommended for the utilization by the commercial vendor.

James L. Tatum, M.D.
Director of Nuclear Cardiology
Operation Director
Division of Nuclear Medicine

St. John Hospital and Medical Center

Date: January 22, 1992

To: Nuclear Medicine Personnel

From: Edward R. Powsner, M.D.

Subject: Preparation of Technetium-99m Sestamibi

NRC regulations require that radiopharmaceuticals be prepared according to the manufacturer's instructions except in those instances where the desired medical results would not be otherwise obtainable. Specifically, DuPont/NEN instructions for Cardiolite (sestamibi) recommend adding 25 to 150 mCi of sodium pertechnetate technetium-99m in 1 to 3 mL. The following change is authorized:

Technetium-99m sestamibi is to be prepared with up to 370 mCi of technetium-99m.

The purpose of this change is to allow the radiopharmacy to dispense the recommended 30 mCi per patient so as to complete the rest/stress study in one day instead of in two days. This reduces the length of stay for inpatients and eliminates the inconvenience of a two-day study for outpatients. Chromatography of the kit prepared this way has repeatedly confirmed that there is 95 to 98% radiochemical purity at 6 hours post-calibration.

MEMORANDUM

TO: NUCLEAR MEDICINE PHYSICIAN STAFF

FROM: RADIOPHARMACIST

SUBJ: PREPARATION OF TC99M CARDIOLITE

I HAVE DETERMINED THAT ONE VIAL CAN "HOLD" UP TO 300 MILLICURIES OF TC99M AND MAINTAIN A TAG OF OVER 95% UP TO 5 HOURS POST PREPARATION. THE PACKAGE INSERT ONLY ALLOWS UP TO 150 MCI TO BE ADDED PER VIAL. THE NRC WILL HOLD US TO THAT LIMIT OF 150 MILLICURIES PER VIAL UNLESS WE STATE THE 1) SPECIFIC NATURE OF THE DEPARTURE FROM THE PACKAGE INSERT, 2) A PRECISE DESCRIPTION OF THE DEPARTURE AND 3) A BRIEF STATEMENT OF THE REASONS WHY THE DEPARTURE FROM THE PACKAGE INSERT PREPARATIONS INSTRUCTIONS WOULD OBTAIN MEDICAL RESULTS NOT OTHERWISE ATTAINABLE OR WOULD REDUCE MEDICAL RISKS TO PARTICULAR PATIENTS BECAUSE OF THEIR MEDICAL CONDITION.

ACCORDINGLY I WOULD LIKE TO HAVE THE STAFF PHYSICIANS SIGN OFF ON THE FOLLOWING STATEMENT. THE RADIOPHARMACY WILL KEEP A RECORD OF THESE PATIENTS FOR FIVE YEARS.

I AUTHORIZE THE ADDITION OF UP TO 300 MILLICURIES OF TC99M PER VIAL OF CARDIOLITE TO REDUCE THE COSTS OF UTILIZATION OF THIS RADIOPHARMACEUTICAL IN PLACE OF THALLIUM 201. THIS REDUCTION IN COST WILL ENABLE THIS MEDICAL CENTER TO USE THIS AGENT WHICH WOULD BE PROHIBITIVE UNDER CURRENT BUDGETARY RESTRAINTS.

agent (manufacturer)	suggested activity	clinical activity
^{99m}Tc Cardiolite (E.R. Squibb)	150	360

The listed radiopharmaceutical has passed radiochemical quality control, historically with labeling efficiencies of 95-99% (reference the daily pharmaceutical quality control sheets).

The agent is prepared at high concentrations because bolus injections of this compound is required for the majority of the clinical studies that use it. Injected volumes of less than 0.5 mL containing 15-20 mCi are needed for statistically adequate images.

Jerry E Knight, M.D.
Director, Nuclear Medicine
Methodist Hospital of Indiana
Indianapolis, IN

Agent (manufacturer)	Suggested act. (mCi)	Clinical act. (mCi)
^{99m}Tc-DTPA (Cis-US)	160	300

The listed radiopharmaceutical has passed radiochemical quality control historically with labeling efficiencies of 95-99% (reference the daily pharmaceutical quality control sheets).

The agent is prepared at high concentrations because bolus injections of this compound is required for the majority of the clinical studies that use it. Injected volumes of less than 0.5 mL containing 15-20 mCi are needed for statistically adequate images.

Jerry Kight, M.D.
Director, Nuclear Medicine
Methodist Hospital of Indiana
Indianapolis, IN

Agent (Kit/Generator)	Suggested act (mCi)	Clinical act (mCi)
^{99m}Tc AN-MDP (DIS-UBI)	300	400

The listed radiopharmaceutical has passed radiochemical quality control, historically with labeling efficiencies of 95-99% (reference the daily pharmaceutical quality control sheets).

The agent is prepared at high concentrations because bolus injections of this compound is required for the majority of the clinical studies that use it. Injected volumes of less than 0.5 mL containing 15-20 mCi are needed for statistically adequate images.

Jerry Knight, M.D.
Director, Nuclear Medicine
Methodist Hospital of Indiana
Indianapolis, IN

agent (manufacturer)	suggested adt (mL)	[illegible]
Tc99m-HSA (Mallinckrodt)	30	45

The listed radiopharmaceutical has passed radiochemical quality control, historically with labeling efficiencies of 95-99% (reference the daily pharmaceutical quality control sheets).

The agent is prepared at high concentrations because bolus injections of this compound is required for the majority of the clinical studies that use it. Injected volumes of less than 0.5 mL containing 15-20 mCi are needed for statistically adequate images

Jerry Kight, M.D.
Director, Nuclear Medicine
Methodist Hospital of Indiana
Indianapolis, IN

MALLINCKRODT
INSTITUTE OF
RADIOLOGY
AT WASHINGTON UNIVERSITY MEDICAL CENTER

DIVISION OF
NUCLEAR MEDICINE

5 November 1990

To: Radiation Safety Officer
Nuclear Medicine Professional and Technical Staff

From: Barry A. Siegel, M.D.
Sally Schwarz, M.S., R.Ph.

Re: NRC Interim Final Rule on Radiopharmaceutical Preparation and Therapeutic Uses of Radiopharmaceuticals

An interim final rule issued by the NRC on 23 August 1990 modifies 10 CFR Parts 30 and 35 to permit (1) certain deviations from manufacturers' instructions for elution of generators and preparation of radiopharmaceuticals and (2) for deviations from therapeutic indications specified in the package insert. Such deviations are permitted at the instruction of an authorized user physician if they are expected to allow specific medical benefits. The rule also imposes the requirement for a written directive (i.e., a prescription) made by an authorized user directing a specific departure for a particular patient, or patients, or for a radiopharmaceutical, and which includes (1) the specific nature of the departure; (2) a precise description of the departure; and (3) a brief statement of the reasons why the departure from the manufacturer's instructions would obtain medical results not otherwise attainable or would reduce medical risks to particular patients because of their medical conditions. Ordinarily, such a written directive would be accomplished generically (see below) or specifically for a particular patient prior to the procedure. An oral directive is acceptable under emergency circumstances, but the rule requires that the written directive must be completed within three working days of the emergency administration. The rule also requires that we maintain records of such departures from manufacturers' instructions in an auditable form for a period of five years.

510 South Kingshighway Boulevard
St. Louis, Missouri 63110
(314) 362-2809

At the present time, we are not aware of deviations in the indications for therapeutic radiopharmaceutical administrations in the Division of Nuclear Medicine, since our sole therapeutic procedure is the administration of I-131 sodium iodide oral solution for treatment of hyperthyroidism.

Attached is a copy of a new "prescription" form to be used when departures from established procedures are requested by an authorized user. Completion of this form will be necessary only for those departures from established procedures that are not already codified in the Division's Clinical Procedure Manual and/or Radiopharmacy Procedure Manual (see below).

The following represent deviations from manufacturers' package labeling in the preparation of radiopharmaceuticals that are established procedures of the Division documented in the Clinical Procedure Manual and/or Radiopharmacy Procedure Manual, and already in effect as of 23 August 1990. This memorandum serves as formal notification to file and to the Radiation Safety Committee of deviations in radiopharmaceutical preparation. (Note that, for the sake of completeness, deviations involving non-byproduct material are included in this listing, although these are not subject to the NRC rule.) Tracking of the numbers of these "established deviations," as required by the NRC, will be simply accomplished by keeping track of the diagnostic codes for these procedures by way of the MIR accounting system.

A. Tc-99m Macroaggregated Albumin (Mallinckrodt)

1. Specific Nature of Departure: Removal of 1/2 of vial contents before compounding and increase the ratio of added Tc-99m pertechnetate to mass of macroaggregated albumin.
2. Description of Departure:
   a. Withdraw 1/2 of vial contents after reconstituting lyophilized particles with 1 mL 0.9% NaCl, USP.
   b. Add 60 mCi Tc-99m pertechnetate to vial.
   c. Use kit within 3 hours (instead of 8 hours).

3. Rationale: Permits particle number of administered particles to be maintained in the range 2.6×10^5 to 4.7×10^5 per 4 or 5 mCi dose of Tc-99m MAA. This is necessary because of the large fraction of our patients with underlying severe parenchymal pulmonary disease or pulmonary hypertension.

B. **Tc-99m Macroaggregated Albumin (DuPont)**

1. Specific Nature of Departure: Add 80 mCi Tc-99m pertechnetate to vial (instead of 50 mCi).
2. Description of Departure:
   a. Add 80 mCi Tc-99m pertechnetate to vial.
   b. Dilute total vial to 8.0 mL using 0.9% NaCl.
   c. Use kit within 3.5 hours (instead of 6 hours).
3. Rationale: Permits particle number of administered particles to be maintained in the range 2.6×10^5 to 4.7×10^5 per 4 or 5 mCi dose of Tc-99m MAA. This is necessary because of the large fraction of our patients with underlying severe parenchymal pulmonary disease or pulmonary hypertension.

C. **Tc-99m Sulfur Colloid (Mallinckrodt)**

1. Specific Nature of Departure: Pass 1 mL of Tc-99m Sulfur Colloid suspension through a 0.45 µm filter.
2. Description of Departure:
   a. Prepare kit with 150 mCi Tc-99m pertechnetate.
   b. Filter 1 mL through 0.45 µm filter.
   c. Use final filtrate for injection.
3. Rationale: Filter allows retention of large colloidal particles. Small particles passing through filter are in the preferred size range for use in lymphoscintigraphy.

D. **In-111 DTPA**

1. Specific Nature of the Departure: Addition of 10% dextrose to the In-111 DTPA being used for injection.
2. Description of the Departure:
   a. Draw volume required for 500 µCi In-111 DTPA dose into a syringe.

b. Dilute volume 1:1 with 10% Dextrose, USP.

3. Rationale: Increases the flow rate of the radiopharmaceutical to the basal cisterns and decreases the "leakage" rate at the lumbar injection site during radionuclide cisternography.

E. **Pyrophosphate (PYP)**

1. Specific Nature of Departure: Washing of Tc-99m modified *in vivo* labeled red blood cells with 0.9% NaCl, USP.

2. Description of Departure:

a. Fifteen minutes after administering 1/2 to 1 vial PYP (vial reconstituted with 2 mL 0.9% NaCl USP), 3-5 mL whole blood is withdrawn into a 6 mL syringe containing 0.5-1.0 mL ACD (acid-citrate-dextrose) solution.

b. The whole blood is added to a sterile yellow-top Vacutainer tube (no additive).

c. Tc-99m pertechnetate (30 mCi adult; 0.25 mCi/kg pediatric + 25% additional) is added to the blood and incubated at room temperature for 10 minutes.

d. The whole blood is then centrifuged at full speed for 4 minutes.

e. The plasma is removed and the Tc-99m activity is measured.

f. The same volume of 0.9% NaCl, USP is added to the red cells remaining in the tube.

g. The tube is inverted several times, and then recentrifuged for 4 minutes at full speed.

h. The supernatant is withdrawn and the Tc-99m activity measured, in both supernatant and red cells.

i. If the supernatant contains > 10% of the total activity, the Tc-99m red cells are washed again (as in step f above).

j. The same volume (as supernatant removed) of 0.9% NaCl is added to the labeled red cells before reinjection.

3. Rationale: The washing step, by removing unbound Tc-99m pertechnetate or free reduced Tc-99m, reduces the likelihood that either gastric or urinary activity will interfere with the interpretation of gastrointestinal bleeding studies.

F. Pyrophosphate (PYP)

1. Specific Nature of Departure: Washing Tc-99m modified *in vivo* labeled red blood cells with 0.9% NaCl, USP, and then damaging labeled cells by heating at 49.5° ± 0.5° C for 20 minutes.

2. Description of Departure:

a. Fifteen minutes after administering 1/2 to 1 vial PYP (vial reconstituted with 2 ml 0.9% NaCl USP), 3-5 mL whole blood is withdrawn into a 6 mL syringe containing 0.5-1.0 mL ACD (acid-citrate-dextrose) solution.

b. The whole blood is added to a sterile yellow-top Vacutainer tube (no additive).

c. Tc-99m pertechnetate (3-6 mCi) is added to the blood and incubated at room temperature for 10 minutes.

d. The whole blood is then centrifuged at full speed for 4 minutes.

e. The plasma is removed and the Tc-99m activity is measured.

f. The same volume of 0.9% NaCl, USP is added to the red cells remaining in the tube.

g. The tube is inverted several times, and then recentrifuged for 4 minutes at full speed.

h. The supernatant is withdrawn and the Tc-99m activity measured, in both supernatant and red cells.

i. If the supernatant contains > 10% of the total activity, the Tc-99m red cells are washed again (as in step f above).

j. The same volume (as supernatant removed) of 0.9% NaCl is added to the red cells before reinjection.

k. Heat the resuspended red cells in a water bath at 49.5° ± 0.5° C for 20 minutes.

l. Centrifuge sample at full speed for 4 minutes.

m. Remove supernatant and measure activity in supernatant and red cells. Add a volume of 0.9% NaCl, USP equal to supernatant removed.

n. Repeat the wash step (step m above) if supernatant contains > 10% of the total activity.

January 10, 1991

Syncor International Corp.
2208 West Central Ave.
Toledo, Ohio 43606

Dear Syncor:

I have reviewed the package insert for 99m Tc Human Serum Albumin and the procedure used in lymphatic imaging with this agent. I understand that this procedure is a deviation from the approved uses.

Until further notice, please use 99m Tc labeled HSA for lymphatic imaging in malignant melanoma. I wish to use the radiopharmaceutical that provides the lowest patient absorbed dose and most rapid diagnostic information. I believe that using 99m Tc labeled HSA represents a significant clinical benefit warranting the use of this procedure for our patients.

Sincerely,

G. B. Mehta, M.D.
Chairman
Department of Radiology

GBM/sac

Att.

HSHN-DRN 6 Feb 1991

MEMORANDUM FOR THE NUCLEAR REGULATORY COMMISSION

SUBJECT: Departure from the Manufacturer's package insert for the preparation of radiopharmaceuticals.

1. In response to the Federal Register, Vol. 55, No. 164, Thursday, August 23, 1990, pages 34513-18, an interim rule titled "Authorization to Prepare Radiopharmaceuticals Reagent Kits and Elute Radiopharmaceutical Generators; Use of Radiopharmaceuticals for Therapy". The interim rule allows licensees who elute generators and prepare reagent kits to depart from the manufacturer's instructions for elution and preparation in the package insert, provided the licensees meet certain conditions and limitations.

2. The following departures from the package insert are used within the Nuclear Medicine Service on either a daily basis or on a as needed basis for benefit of patient care and diagnostic studies.

a. On a daily basis, Methylene Diphosphonate (MDP) cold kits, by any manufacturer are compounded with an activity of 600 mCi of ^{99m}Tc Pertechnetate as a cost savings measure to the clinic. Most kits on the market are limited (by the package insert) to 200 mCi. Radiochemical purity is checked daily, using paper chromatography to insure the tagged compound is within the USP and NRC guidelines.

b. On a daily basis, Ascorbic Acid (3 mg) is added to the MDP kits to prevent any oxidation of the kit and resulting breakdown of the kit.

c. For V/Q scans on patients with a Right to Left shunt, or in patients with possible pulmonary hypertension, the Macroaggregated Albumin (MAA) kits are compounded with 100 mCi of ^{99m}Tc Pertechnetate. Double the amount stated in the package insert, in the effort to limit the number of particles injected during the study.

d. On a weekly basis, Xe-133 as a radiochemical is dissolved in saline and used for injection for burn lung and heart right ventricle "first pass" studies.

e. As needed, ^{99m}Tc Diethyelenetriamine pentaacetic acid (DTPA) is used for gastric emptying studies.

f. As needed, ^{99m}Tc-exametazine white blood cells are labeled for detection of infection.

(CONT'D)

3. The above uses, while not included in the package insert, are reported in current medical journals of nuclear medicine and are found to be useful and appropriate for medical care at this medical facility.

JAMES D. HEIRONIMUS II, M.D.
Lt. Col., USAF, MC
Chief, Nuclear Medicine Service

syncor

DELAWARE SPECT[illegible]
0-40 OMEGA DRIVE
NEWARK, DELAWARE 97[illegible]
302[illegible]

Dear Syncor:

In accordance with the August 23, 1990 Interim Final Rule issued by the Nuclear Regulatory Commission concerning the compounding and use of radiopharmaceuticals, I hereby direct you to compound and dispense Tc99m Sulfur Colloid, MDP, MAA, and other Tc-99 radiopharmaceuticals in accordance with the Syncor prep guidelines. I recognize that the manufacturers'package inserts for these products specify a 6 hour time of use, but my experience in their use has demonstrated that they may in fact be safely and effectively used for up to 12 hours. The 12 hour time of use is needed to that the scheduling of the use of these products is neither inconvenient for this facility or to its patients.

This directive applies to all orders for the mentioned radiopharmaceuticals unless you are informed otherwise.

Sincerely,

3/3/91

To: Frank Ruddy, Pharmacy Manager
Megan McDonough, Pharmacy Representative

From: James H. Hamilton M.D.

RE: Written Directive for Eluting Generators and Preparing Radiopharmaceuticals

Dear Megan and Frank,

As we discussed on December , 1990, I request that Syncor International Corporation prepare and dispense Radiopharmaceuticals according to the attached Kit Preparation Guidelines, dated November 1989. I have initialed a copy of the Guidelines attatched to indicate our review.

The attached guidelines satisfy the requirements of 10 CFR Part 35.200 that I provide a written directive with the nat[illegible]d precise description of departures from the manufacturer's instructions in eluting generators and preparing diagnostic reagent kits.

In my judgement, these departures from manufacturer's instructions are justified for the following reasons:

- Adjusting the activity used in reconstituting MAA is necessary for patient safety. Failure to make this compensation could result in administration of an improper number of particles to the patient, posing a significant risk to the patient in the event of pulmonary embolus.

- Times of use for Sulfur Colloid, MDP, and MAA are extended to twelve hours to facilitate patient scheduling during the day and to allow overnight use of doses for emergency cases. Time of use for TcO4 is extended to twenty four hours for the same reason.

- Times of use for Sulfur Colloid, MDP, MAA, and TcO4 have been extended to allow for a practical delivery schedule from the pharmacy. Without the option of using the services of a radiopharmacy, this department would be forced to elute generators and prepare radiopharmaceuticals in-house. Because of the widespread shortage of qualified Nuclear Medicine Technologists, the time diverted to these activities would result in a reduction in the quality and quantity of patient care delivered in this department. Further, we believe that using a centralized radiopharmacy allows this institution [illegible]ake advantage of the experience and expertise of a licensed radiopharmacist which we would not otherwise have.

This directive applies to all orders placed by this institution for these radiopharmaceuticals, unless you are specifically instructed otherwise at the time the order is placed, or until this directive is cancelled or replaced.

Sincerely yours,

James H. Hamilton M.D.

C NSULTING RADIOLC IS . S CORP.

RADIOLOGISTS
S T PINSKY M D
R E MYERS M D
R W SIDERS M D
P M ROYEN M D
S E GORDON M D
M F FADELL M D
D E HOOVER M D
G B GLASSBERG M D
D R DOERFLER M D
S L MAYES M D
T T LOH M D
S S MANION M D

X-RAY, ULTRASOUND AND NUCLEAR MEDICINE
Physicians and Surgeons Building
3100 W. Central Avenue
Toledo, Ohio 43606
(419) 535-7758

BUSINESS OFFICE
4351 Monroe Street
Toledo, Ohio 43606
(419) 473-3553

October 16, 1990

Syncor Inc.
2208 W. Central Ave.
Toledo, Oh. 43606

Dear Syncor:

In accordance with the August 23, 1990 Interim Final Rule issued by the Nuclear Regulatory Commission concerning the compounding and use of radiopharmaceuticals, I hereby direct you to compound and dispense Tc99m Sulfur Colloid, MDP, MAA and other Tc-99 radiopharmaceuticals in accordance with the Syncor prep guidelines. I recognize that the manufacturers' package inserts for these products specify a 6 hour time of use, but my experience in their use has demonstrated that they may in fact be safely and effectively used for up to 12 hours. The 12 hour time of use is needed so that the scheduling of the use of these products is neither inconvenient for this facility or to its patients.

This directive applies to all orders for the mentioned radiopharmaceuticals unless you are informed otherwise.

Sincerely,

S. T. Pinsky, M. D.

STP/nk

Written Directive for exceeding recommended package insert dosage:

MDP- In my judgement, these departures from manufacturers instructions are justified for the following reason:

Adjusting the activity used for Bone scans to 27-30 mCi, to allow for SPECT imaging with greater count rates, and decreased scannin time. Also to increase scan quality and image resolution. *

Russell O Brien
Authorized User Physician

*The patients health will not be affected by this change.

January 1, 1991

Written Directive for exceeding recommended package insert dosage:

201 Tl- In my judgement, these departures from manufacturers instructions are justified for the following reason:

Adjusting the dosage for Thallium 201 Chloride to 3.5-3.8 mCi to decrease imaging time and to increase image quality and resolution, while performing SPECT Thallium studies.

The patients health will not be affected by this change.

Burnell O Boyd
Authorized User Physician

January 1, 1991

Written Directive for exceeding recommended package insert dosage:

DTPA- We will be using 99mTc DTPA Aerosol in place of 133Xe gas for Ventilation lung imaging. In my judgement, these departures from manufacturers instructions are justified for the following reasons:

The availability of 99mTc DTPA and the reduction in cost, greatly exceeds that of 133Xe gas.

Aerosol studies are preferred over gaseous studies (in this institution) because all views of the lung may be obtained with aerosol imaging, which provides a better mechanism for comparison with the perfusion images.

No need for negative air flow in imaging rooms which requires monitoring twice yearly to comply with NRC specifications.

The patients health will not be affected by this change.

Burnell O Bra

Authorized User Physician

January 1, 1991

Hendricks County Hospital
1000 East Main Street
P.O. Box 409
Danville, Indiana 46122
(317) 745-4451

October 17, 1990

Dear Syncor:

In accordance with the August 23,1990 Interim Final Rule issued by the Nuclear Regulatory Commission concerning the compounding and use of radiopharmaceuticals. I hereby direct you to compound and dispense Tc-99m sulfur Colloid, MDP, MAA, and other Tc-99m radiopharmaceuticals in accordance with Syncor Kit Prep Guidelines. I recognize that the manufacturer's packages inserts for these products specify 6 hour time of use, but my experience in their use has demonstrated that they may in fact be used safely and effectively for up to 12 hours. The twelve hour time of use is needed so that the scheduling of the use of products is neither inconvenient for this facility or to its patients.

This directive applies to all orders for the mentioned radiopharmaceuticals unless you are informed otherwise.

Sincerely,

John Calhoon

Dr. John P. Calhoon, M.D.

TO: Syncor Pharmacy Manager

FROM: Authorized User Physician

RE: Written Directive for Eluting Generators and Preparing Radiopharmaceuticals

As we discussed on 17 December, 1996, I request that Syncor International Corporation prepare and dispense Radiopharmaceuticals according to the attached Kit Preparation Guidelines, dated November 1989. I have initialed the copy of Guidelines attached to indicate our review.

The attached guidelines satisfy the requirements of 10 CFR Part 35.200 that I provide a written directive with the nature and precise description of departures from manufacturer's instructions in eluting generators and preparing diagnostic reagent kits.

In my judgement, these departures from manufacturer's instructions are justified for the following reasons:

- Adjusting the activity used in reconstituting MAA is necessary for patient safety. Failure to make this compensation could result in administration of an improper number of particles to the patient, posing a significant risk to the patient in the event of pulmonary embolus.

- Times of use for Sulfur Colloid, MDP and MAA are extended to twelve hours to facilitate patient scheduling during the day, and to allow overnight use of doses for emergency cases.

- Times of use for Sulfur Colloid, MDP and MAA are extended to twelve hours, to allow for a practical delivery schedule from the pharmacy. Without the option of using the services of a radiopharmacy, this department would be forced to elute generators and prepare radiopharmaceuticals in-house. Because of the widespread shortage of qualified Nuclear Medicine Technologists, the time diverted to these activities would result in a reduction in the quality and quantity of patient care delivered by this department. Further, we believe that using a centralized radiopharmacy allows this institution to take advantage of the experience and expertise of a licensed radiopharmacist which we would not otherwise have.

NOTE: Follow Package Insert Requirements for DTPA-Renal Exp Time

This directive applies to all orders placed by this institution for these radiopharmaceuticals, unless you are specifically instructed otherwise at the time the order is placed, or until this directive is cancelled or replaced.

Sincerely yours,

T. M. JAMISON, MD

Williamsburg Community Hospital
Williamsburg, Virginia 23185

Floyd Memorial Hospital

January 11, 1991

Mike Wyant, Pharmacy Manager
Syncor International
Pharmacy Service Center
831 South 6th Street
Louisville, KY 40203

Dear Syncor:

In accordance with the August 23, 1990 Interim Final Rule issued by the Nuclear Regulatory Commission concerning the compounding and use of radiopharmaceuticals, I hereby direct you to compound and dispense Tc99m Sulfur Colloid, MDP, MAA, and other Tc-99 radiopharmaceuticals in accordance with the Syncor prep guidelines. I recognize that the manufacturer's package inserts for these products specify a 6 hour time of use, but my experience in their use has demonstrated that they may in fact be safely and effectively used for up to 12 hours. The 12 hour time of use is needed so that the scheduling of the use of these products is neither inconvenient for this facility or to its patients.

This directive applies to all orders for the mentioned radiopharmaceuticals unless you are informed otherwise.

Sincerely,

William R. Fortner, M.D.
Radiation Safety Officer

WRF:kmb

§ 30.33 General requirements for issuance of specific licenses.

(a) An application for a specific license will be approved if:

(1) The application is for a purpose authorized by the Act;

(2) The applicant's proposed equipment and facilities are adequate to protect health and minimize danger to life or property;

(3) The applicant is qualified by training and experience to use the material for the purpose requested in such manner as to protect health and minimize danger to life or property;

(4) The applicant satisfies any special requirements contained in Parts 32 through 35 and 39; and

(5) In the case of an application for a license to receive and possess byproduct material for the conduct of any activity which the Commission determines will significantly affect the quality of the environment, the Director of Nuclear Material Safety and Safeguards or his designee, before commencement of construction of the plant or facility in which the activity will be conducted, on the basis of information filed and evaluations made pursuant to Subpart A of Part 51 of this chapter, has concluded, after weighing the environmental, economic, technical, and other benefits against environmental costs and considering available alternatives, that the action called for is the issuance of the proposed license, with any appropriate conditions to protect environmental values. Commencement of construction prior to such conclusion shall be grounds for denial of a license to receive and possess byproduct material in such plant or facility. As used in this paragraph the term "commencement of construction" means any clearing of land, excavation, or other substantial action that would adversely affect the environment of a site. The term does not mean site exploration, necessary roads for site exploration, borings to determine foundation conditions, or other preconstruction monitoring or testing to establish background information related to the suitability of the site or the protection of environmental values.

(b) Upon a determination that an application meets the requirements of the Act, and the regulations of the Commission, the Commission will issue a specific license authorizing the possession and use of byproduct material (Form NRC 374, "Byproduct Material License").

§ 30.34 Terms and conditions of licenses.

(a) Each license issued pursuant to the regulations in this part and the regulations in Parts 31 through 35 and 39 of this chapter shall be subject to all the provisions of the Act, now or hereafter in effect, and to all valid rules, regulations and orders of the Commission.

(b) No license issued or granted pursuant to the regulations in this part and Parts 31 through 35, and 39 nor any right under a license shall be transferred, assigned or in any manner disposed of, either voluntarily or involuntarily, directly or indirectly, through transfer of control of any license to any person, unless the Commission shall, after securing full information, find that the transfer is in accordance with the provisions of the Act and shall give its consent in writing.

(c) Each person licensed by the Commission pursuant to the regulations in this part and Parts 31 through 35 and 39 shall confine his possession and use of the byproduct material to the locations and purposes authorized in the license. Except as otherwise provided in the license, a license issued pursuant to the regulations in this part and Parts 31 through 35 and 39 of this chapter shall carry with it the right to receive, acquire, own, and possess byproduct material. Preparation for shipment and transport of byproduct material shall be in accordance with the provisions of Part 71 of this chapter.

(d) Each license issued pursuant to the regulations in this part and Parts 31 through 35 and 39 shall be deemed to contain the provisions set forth in section 183b.-d., inclusive, of the Act, whether or not these provisions are expressly set forth in the license.

(e) The Commission may incorporate, in any license issued pursuant to the regulations in this part and Parts 31 through 35 and 39, at the time of issuance, or thereafter by appropriate rule, regulation or order, such additional requirements and conditions with respect to the licensee's receipt, possession, use and transfer of byproduct material as it deems appropriate or necessary in order to:

(1) Promote the common defense and security;

(2) Protect health or to minimize danger to life or property;

(3) Protect restricted data;

(4) Require such reports and the keeping of such records, and to provide for such inspections of activities under the license as may be necessary or appropriate to effectuate the purposes of the Act and regulations thereunder.

(f) Licensees required to submit emergency plans by § 30.32(i) shall follow the emergency plan approved by the Commission. The licensee may change the approved without Commission approval only if the changes do not decrease the effectiveness of the plan. The licensee shall furnish the change to the appropriate NRC Regional Office specified in § 30.6 and to affected offsite response organizations within six months after the change is made. Proposed changes that decrease, or potentially decrease, the effectiveness of the approved emergency plan may not be implemented without prior application to and prior approval by the Commission.

(g) Each licensee preparing technetium-99m radiopharmaceuticals from molybdenum-99 alumina generators shall test the generator eluates for molybdenum-99 breakthrough in accordance with § 35.204 of this chapter. The licensee shall record the results of each test and retain each record for three years after the record is made.

(h)(1) Each licensee shall notify the appropriate NRC Regional Administrator, in writing, immediately following the filing of a voluntary or involuntary petition for bankruptcy under any Chapter of Title 11 (Bankruptcy) of the United States Code by or against:

(i) The licensee;

(ii) An entity (as that term is defined in 11 U.S.C. 101(14)) controlling the licensee or listing the license or licensee as property of the estate; or

(iii) An affiliate (as that term is defined in 11 U.S.C. 101(2)) of the licensee.

(2) This notification must indicate:

(i) The bankruptcy court in which the petition for bankruptcy was filed; and

(ii) The date of the filing of the petition.

(i)(1) From August 23, 1990, to August 23, 1993, each licensee eluting generators and processing radioactive material with diagnostic reagent kits for which the Food and Drug Administration (FDA) has approved a "New Drug Application" (NDA) may depart from the manufacturer's elution and preparation instructions (for radiopharmaceuticals authorized for use pursuant to § 35.200) provided that:

(i) The licensee has a written directive made by an authorized user physician that directs a specific departure for a particular patient, or patients, or for a radiopharmaceutical, and which includes the specific nature of the departure, a precise description of the departure, and a brief statement of the reasons why the departure from the manufacturer's instructions for preparing the radiopharmaceutical would obtain medical results not otherwise attainable or would reduce medical risks to particular patients because of their medical condition. The licensee shall keep the written directive

A/2

and record of the number of prescriptions dispensed under the departure in an auditable form and available for inspection for 5 years; or

(ii) An authorized user physician determines, in accordance with § 35.20(c), that a delay in preparing the radiopharmaceutical in order to make a written directive would jeopardize the patient's health because of the emergent nature of the patient's medical condition. In this case, the licensee shall obtain the written directive made by the authorized user physician which contains the notation regarding the emergency and all the information specified in paragraph (i)(1)(i) of this section within 3 working days after the prescribed departure. The licensee shall keep these records in an auditable form and available for inspection for 5 years.

(2) The actions authorized in paragraph (i)(1) of this section are permitted notwithstanding more restrictive language in license conditions unless those license conditions specifically reference § 30.34(i).

(3) Nothing in this section relieves the licensee from complying with other applicable NRC, FDA, and other Federal or State regulations governing the elution of generators and preparation of reagent kits.

55 FR 34513

§ 30.35 Financial assurance and recordkeeping for decommissioning.

(a) Each applicant for a specific license authorizing the possession and use of unsealed byproduct material of half-life greater than 120 days and in quantities exceeding 10^6 times the applicable quantities set forth in appendix C to §§ 20.1–20.601 of 10 CFR part 20 shall submit a decommissioning funding plan as described in paragraph (e) of this section. The decommissioning funding plan must also be submitted when a combination of isotopes is involved if R divided by 10^6 is greater than 1 (unity rule), where R is defined here as the sum of the ratios of the quantity of each isotope to the applicable value in appendix C to §§ 20.1–20.601 of 10 CFR part 20.

56 FR 23360

(b) Each applicant for a specific license authorizing possession and use of byproduct material of half-life greater than 120 days and in quantities specified in paragraph (d) of this section shall either—

(1) Submit a decommissioning funding plan as described in paragraph (e) of this section; or

(2) Submit a certification that financial assurance for decommissioning has been provided in the amount prescribed by paragraph (d) of this section using one of the methods described in paragraph (f) of this section. For an applicant, this certification may state that the appropriate assurance will be obtained after the application has been approved and the license issued but prior to the receipt of licensed material. As part of the certification, a copy of the financial instrument obtained to satisfy the requirements of paragraph (f) of this section is to be submitted to NRC.

53 FR 24018

(c) (1) Each holder of a specific license issued on or after July 27, 1990, which is of a type described in paragraph (a) or (b) of this section, shall provide financial assurance for decommissioning in accordance with the criteria set forth in this section.

(2) Each holder of a specific license issued before July 27, 1990, and of a type described in paragraph (a) of this section shall submit, on or before July 27, 1990, a decommissioning funding plan or a certification of financial assurance for decommissioning in an amount at least equal to $750,000 in accordance with the criteria set forth in this section. If the licensee submits the certification of financial assurance rather than a decommissioning funding plan at this time, the licensee shall include a decommissioning funding plan in any application for license renewal.

(3) Each holder of a specific license issued before July 27, 1990, and of a type described in paragraph (b) of this section shall submit, on or before July 27, 1990, a certification of financial assurance for decommissioning or a decommissioning funding plan in accordance with the criteria set forth in this section.

56 FR 23360

(d) Table of required amounts of financial assurance for decommissioning by quantity of material.

greater than 10^4 but less than or equal to 10^6 times the applicable quantities of appendix C to §§ 20.1–20.601 of 10 CFR part 20 in unsealed form. (For a combination of isotopes, if R, as defined in § 30.35(a), divided by 10^4 is greater than 1 but R divided by 10^6 is less than or equal to 1.)	$750,000
greater than 10^3 but less than or equal to 10^4 times the applicable quantities of appendix C to §§ 20.1–20.601 of 10 CFR part 20 in unsealed form. (For a combination of isotopes, if R, as defined in § 30.35(a), divided by 10^3 is greater than 1 but R divided by 10^4 is less than or equal to 1.)	$150,000
greater than 10^{10} times the applicable quantities of appendix C to §§ 20.1–20.601 of 10 CFR part 20 in sealed sources or plated foils. (For a combination of isotopes, if R, as defined in § 30.35(a), divided by 10^{10} is greater than 1).	$75,000

53 FR 24018

(e) Each decommissioning funding plan must contain a cost estimate for decommissioning and a description of the method of assuring funds for decommissioning from paragraph (f) of this section, including means of adjusting cost estimates and associated funding levels periodically over the life of the facility.

53 FR 24018

(f) Financial assurance for decommissioning must be provided by one or more of the following methods:

(1) Prepayment. Prepayment is the deposit prior to the start of operation into an account segregated from licensee assets and outside the licensee's administrative control of cash or liquid assets such that the amount of funds would be sufficient to pay decommissioning costs. Prepayment may be in the form of a trust, escrow account, government fund, certificate of deposit, or deposit of government securities.

(2) A surety method, insurance, or other guarantee method. These methods guarantee that decommissioning costs will be paid should the licensee default. A surety method may be in the form of a surety bond, letter of credit, or line of credit. A parent company guarantee of funds for decommissioning costs based on a financial test may be used if the guarantee and test are as contained in Appendix A to this part. A parent company guarantee may not be used in combination with other financial methods to satisfy the requirements of this section. Any surety method or insurance used to provide financial assurance for decommissioning must contain the following conditions:

(i) The surety method or insurance must be open-ended or, if written for a specified term, such as five years, must be renewed automatically unless 90 days or more prior to the renewal date, the issuer notifies the Commission, the beneficiary, and the licensee of its intention not to renew. The surety method or insurance must also provide that the full face amount be paid to the beneficiary automatically prior to the expiration without proof of forfeiture if the licensee fails to provide a replacement acceptable to the Commission within 30 days after receipt of notification of cancellation.

(ii) The surety method or insurance must be payable to a trust established for decommissioning costs. The trustee and trust must be acceptable to the Commission. An acceptable trustee includes an appropriate State or Federal government agency or an entity which has the authority to act as a trustee and whose trust operations are regulated and examined by a Federal or State agency.

(iii) The surety method or insurance must remain in effect until the Commission has terminated the license.

(3) An external sinking fund in which deposits are made at least annually, coupled with a surety method or insurance, the value of which may decrease by the amount being accumulated in the sinking fund. An external sinking fund is a fund established and maintained by setting aside funds periodically in an account segregated from licensee assets and outside the licensee's administrative control in which the total amount of funds would be sufficient to pay

tains the information called for in the following statement, appears on a label affixed to each prepackaged unit or appears in a leaflet or brochure which accompanies the package:[1]

This radioactive material may be received, acquired, possessed, and used only by physicians, veterinarians in the practice of veterinary medicine, clinical laboratories or hospitals and only for in vitro clinical or laboratory tests not involving internal or external administration of the material, or the radiation therefrom, to human beings or animals. Its receipt, acquisition, possession, use, and transfer are subject to the regulations and a general license of the U.S. Nuclear Regulatory Commission or of a State with which the Commission has entered into an agreement for the exercise of regulatory authority.

(Name of Manufacturer)

(e) The label affixed to the unit, or the leaflet or brochure which accompanies the package, contains adequate information as to the precautions to be observed in handling and storing such byproduct material. In the case of the Mock Iodine-125 reference or calibration source, the information accompanying the source must also contain directions to the licensee regarding the waste disposal requirements set out in § 20.301 of Part 20 of this chapter.

§ 32.72 Manufacture and distribution of radiopharmaceuticals containing byproduct material for medical use under Part 35.

(a) An application for a specific license to manufacture and distribute radiopharmaceuticals containing byproduct material for use by persons authorized pursuant to Part 35 of this chapter will be approved if:

(1) The applicant satisfies the general requirements specified in § 30.33 of this chapter;

(2) The applicant submits evidence that:

(i) The radiopharmaceutical containing byproduct material will be manufactured, labeled, and packaged in accordance with the Federal Food, Drug and Cosmetic Act or the Public Health Service Act, such as a new drug application (NDA) approved by the Food and Drug Administration (FDA), a biologic product license issued by FDA, or a "Notice of Claimed Investigational Exemption for a New Drug" (IND) accepted by FDA; or

(ii) The manufacture and distribution of the radiopharmaceutical containing byproduct material is not subject to the Federal Food, Drug, and Cosmetic Act and the Public Health Service Act.

(3) The applicant submits information on the radionuclide, chemical and physical form, packaging including maximum activity per package, and shielding provided by the packaging of the byproduct material that is appropriate for safe handling and storage of radiopharmaceuticals by group licensees; and

(4)(i) The label affixed to each package of the radiopharmaceutical contains information on the radionuclide, quantity, and date of assay, and the label, or the leaflet or brochure that accompanies each package, contains a statement that the U.S. Nuclear Regulatory Commission has approved distribution of the radiopharmaceutical to persons licensed to use byproduct material listed in §§ 35.100, 35.200, or 35.300, as appropriate, and to persons who hold an equivalent license issued by an Agreement State. However, labels worded in accordance with requirements that were in place on March 30, 1987 may be used until March 30, 1989.

(ii) The labels, leaflets or brochures required by this paragraph are in addition to the labeling required by the Food and Drug Administration (FDA) and they may be separate from or, with the approval of FDA, may be combined with the labeling required by FDA.

(b) If an application is filed pursuant to paragraph (a) of this section on or before October 15, 1974, for a license to manufacture and distribute a radiopharmaceutical that was distributed commercially on or before August 16, 1974, the applicant may continue the distribution of such radiopharmaceutical to group licensees until the Commission issues the license or notifies the applicant otherwise.

§ 32.73 Manufacture and distribution of generators or reagent kits for preparation of radiopharmaceuticals containing byproduct material.

(a) An application for a specific license to manufacture and distribute generators or reagent kits containing byproduct material for preparation of radiopharmaceuticals by persons licensed pursuant to § 35.14 of this chapter for the uses listed in Group III of Schedule A, § 35.100 of this chapter will be approved if (See Note 1):

(1) The applicant satisfies the general requirements specified in § 30.33 of this chapter;

(2) The applicant submits evidence that:

(i) The generator or reagent kit is to be manufactured, labeled, and packaged in accordance with the Federal Food, Drug, and Cosmetic Act or the Public Health Service Act, such as a new drug application (NDA) approved by the Food and Drug Administration (FDA), a biologic product license issued by FDA, or a "Notice of Claimed Investigational Exemption for a New Drug" (IND) accepted by FDA; or

(ii) The manufacture and distribution of the generator or reagent kit are not subject to the Federal Food, Drug, and Cosmetic Act and the Public Health Service Act.

(3) The applicant submits information on the radionuclide, chemical and physical form, packaging including maximum activity per package, and shielding provided by the packaging of the byproduct material contained in the generator or reagent kit;

(4) The label affixed to the generator or reagent kit contains information on the radionuclide, quantity, and date of assay; and

(5) The label affixed to the generator or reagent kit, or the leaflet or brochure which accompanies the generator or reagent kit, contains:

(i) Adequate information, from a radiation safety standpoint, on the procedures to be followed and the equipment and shielding to be used in eluting the generator or processing radioactive material with the reagent kit, and

(ii) A statement that this generator or reagent kit [as appropriate] is approved for distribution to persons licensed by the U.S. Nuclear Regulatory Commission to use byproduct material identified in § 35.200 or under an equivalent license of an Agreement State. However, labels worded in accordance with requirements that were in place on March 30, 1987 may be used until March 30, 1989.

The labels, leaflets or brochures required by this paragraph are in addition to the labeling required by FDA and they may be separate from or, with the approval of FDA, may be combined with the labeling required by FDA.

[1] Labels authorized by the regulations in effect on September 26, 1979, may be used until one year from September 27, 1979.

(b) If an application is filed pursuant to paragraph (a) of this section on or before October 15, 1974, for a license to manufacture and distribute a generator or reagent kit that was distributed commercially on or before August 16, 1974, the applicant may continue the distribution of such generator or reagent kit until the Commission issues the license or notifies the applicant otherwise.

NOTE 1: Although the Commission does not regulate the manufacture and distribution of reagent kits that do not contain byproduct material, it does regulate the use of such reagent kits for the preparation of radiopharmaceuticals containing byproduct material as part of its licensing and regulation of the users of byproduct material. Any manufacturer of reagent kits that do not contain byproduct material who desires to have his reagent kits approved by the Commission for use by persons licensed pursuant to § 35.14 and Group III of Schedule A, § 35.100 of this chapter may submit the pertinent information specified in this § 32.73.

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§ 32.74 Manufacture and distribution of sources or devices containing byproduct material for medical use.

51 FR 36932

(a) An application for a specific license to manufacture and distribute sources and devices containing byproduct material to persons licensed pursuant to Part 35 of this chapter for use as a calibration or reference source or for the uses listed in §§ 35.400 and 35.500 of this chapter will be approved if:

(1) The applicant satisfies the general requirements in § 30.33 of this chapter;

(2) The applicant submits sufficient information regarding each type of source or device pertinent to an evaluation of its radiation safety, including:

(i) The byproduct material contained, its chemical and physical form, and amount;

(ii) Details of design and construction of the source or device;

(iii) Procedures for, and results of, prototype tests to demonstrate that the source or device will maintain its integrity under stresses likely to be encountered in normal use and accidents;

(iv) For devices containing byproduct material, the radiation profile of a prototype device;

(v) Details of quality control procedures to assure that production sources and devices meet the standards of the design and prototype tests;

(vi) Procedures and standards for calibrating sources and devices;

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(vii) Legend and methods for labeling sources and devices as to their radioactive content;

(viii) Instructions for handling and storing the source or device from the radiation safety standpoint, these instructions are to be included on a durable label attached to the source or device or attached to a permanent storage container for the source or device; *Provided*, That instructions which are too lengthy for such label may be summarized on the label and printed in detail on a brochure which is referenced on the label;

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(3) The label affixed to the source or device, or to the permanent storage container for the source or device, contains information on the radionuclide, quantity and date of assay, and a statement that the U.S. Nuclear Regulatory Commission has approved distribution of the (name of source or device) to persons licensed to use byproduct material identified in §§ 35.58, 35.400, or 35.500, as appropriate, and to persons who hold an equivalent license issued by an Agreement State. However, labels worded in accordance with requirements that were in place on March 30, 1987 may be used until March 30, 1989.

(b) (1) In the event the applicant desires that the source or device be required to be tested for leakage of radioactive material at intervals longer than six months, he shall include in his application sufficient information to demonstrate that such longer interval is justified by performance characteristics of the source or device or similar sources or devices and by design features that have a signficiant bearing on the probability or consequences of leakage of radioactive material from the source.

(2) In determining the acceptable interval for test of leakage of radioactive material, the Commission will consider information that includes, but is not limited to:

(i) Primary containment (source capsule);

(ii) Protection of primary containment;

(iii) Method of sealing containment;

(iv) Containment construction materials;

(v) Form of contained radioactive material;

(vi) Maximum temperature withstood during prototype tests;

(vii) Maximum pressure withstood during prototype tests;

(viii) Maximum quantity of contained radioactive material;

(ix) Radiotoxicity of contained radioactive material;

(x) Operating experience with identical sources or devices or similarly designed and constructed sources or devices.

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(c) If an application is filed pursuant to paragraph (a) of this section on or before October 15, 1974, for a license to manufacture and distribute a source or device that was distributed commercially on or before August 16, 1974, the applicant may continue the distribution of such source or device to group licensees until the Commission issues the license or notifies the applicant otherwise.

§ 32.101 Schedule B—Prototype tests for luminous safety devices for use in aircraft.

An applicant for a license pursuant to § 32.53 shall conduct prototype tests on each of five prototype luminous safety devices for use in aircraft as follows:

(a) *Temperature-altitude test.* The device shall be placed in a test chamber as it would be used in service. A temperature-altitude condition schedule shall be followed as outlined in the following steps:

Step 1. The internal temperature of the test chamber shall be reduced to -62° C. (-80° F.) and the device shall be maintained for at least 1 hour at this temperature at atmospheric pressure.

Step 2. The internal temperature of the test chamber shall be raised to -54° C. (-65° F.) and maintained until the temperature of the device has stabilized at -54° C. at atmospheric pressure.

Step 3. The atmospheric pressure of the chamber shall be reduced to 83 millimeters of mercury absolute pressure while the chamber temperature is maintained at -54° C.

Step 4. The internal temperature of the chamber shall be raised to -10° C. (+14° F.) and maintained until the temperature of the device has stabilized at -10° C., and the internal pressure of the chamber shall then be adjusted to atmospheric pressure. The test chamber door shall then be opened in order that frost will form on the device, and shall remain open until the frost has melted but not long enough to allow the moisture to evaporate. The door shall then be closed.

30 FR 8185

PART 35

MEDICAL USE OF BYPRODUCT MATERIAL

Authority: Secs. 81, 161, 182, 183, 68 Stat. 935, 948, 953, 954, as amended (42 U.S.C. 2111, 2201, 2232, 2233); sec. 201, 88 Stat. 1242, as amended (42 U.S.C. 5841).

For the purposes of sec. 223, 68 Stat. 958, as amended (42 U.S.C. 2273); §§ 35.11, 35.13, 35.20 (a) and (b), 35.21 (a) and (b), 35.22, 35.23, 35.25, 35.27 (a), (c) and (d), 35.31(a), 35.32(a), 35.49, 35.50 (a)–(d), 35.51 (a)–(c), 35.53 (a)–(b), 35.59 (a)–(c), (e)(1), (g) and (h), 35.60, 35.61, 35.70 (a)–(f), 35.75, 35.80 (a)–(e), 35.90, 35.92(a), 35.120, 35.200 (b) and (c), 35.204 (a) and (b), 35.205, 35.220, 35.300, 35.310(a), 35.315, 35.320, 35.400, 35.404(a), 35.406 (a) and (c), 35.410(a), 35.415, 35.420, 35.500, 35.520, 35.605, 35.606, 35.610 (a) and (b), 35.615, 35.620, 35.630 (a) and (b), 35.632 (a)–(f), 35.634 (a)–(e), 35.636 (a) and (b), 35.641 (a) and (b), 35.643 (a) and (b), 35.645 (a) and (b), 35.900, 35.910, 35.920, 35.930, 35.932, 35.934, 35.940, 35.941, 35.950, 35.960, 35.961, 35.970, and 35.971 are issued under sec. 161b, 68 Stat. 948, as amended (42 U.S.C. 2201(b)); and §§ 35.14, 35.21(b), 35.22(b), 35.23(b), 35.27 (a) and (c), 35.29(b), 35.32 (b)–(f), 35.33 (a)–(b), 35.36(b), 35.50(e), 35.51(d), 35.53(c), 35.59 (d) and (e)(2), 35.59 (g) and (i), 35.70(g), 35.80(f), 35.92(b), 35.200(c), 35.204(c), 35.300(b), 35.310(b), 35.315(b), 35.404(b), 35.406 (b) and (d), 35.410(b), 35.415(b), 35.610(c), 35.615(d)(4), 35.630(c), 35.632(g), 35.634(f), 35.636(c), 35.641(c), 35.643(c), 35.645, and 35.647(c) are issued under sec. 161o, 68 Stat. 950, as amended (42 U.S.C. 2201(o)).

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Subpart A—General Information

§ 35.1 Purpose and scope.

This part prescribes requirements and provisions for the medical use of byproduct material and for issuance of specific licenses authorizing the medical use of this material. These requirements and provisions provide for the protection of the public health and safety. The requirements and provisions of this part are in addition to, and not in substitution for, others in this chapter. The requirements and provisions of Parts 19, 20, 21, 30, 71, and 170 of this chapter apply to applicants and licensees subject to this part unless specifically exempted.

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§ 35.2 Definitions.

"Address of use" means the building or buildings that are identified on the license and where byproduct material may be received, used, or stored.

"Agreement State" means any State with which the Commission or the Atomic Energy Commission has entered into an effective agreement under subsection 274b of the Atomic Energy Act of 1954, as amended.

"ALARA" (as low as reasonably achievable) means making every reasonable effort to maintain exposures to radiation as far below the dose limits as is practical:

(1) Consistent with the purpose for which the licensed activity is undertaken,

(2) Taking into account the state of technology, the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, and

(3) In relation to utilization of nuclear energy in the public interest.

"Area of use" means a portion of an address of use that has been set aside for the purpose of receiving, using, or storing byproduct material.

"Authorized user" means a physician, dentist, or podiatrist who is identified as an authorized user on a Commission or Agreement State license that authorizes the medical use of byproduct material.

"Brachytherapy source" means an individual sealed source or a manufacturer-assembled source train that is not designed to be disassembled by the user.

"Dedicated check source" means a radioactive source that is used to assure the constant operation of a radiation detection or measurement device over several months or years.

"Dental use" means the intentional external administration of the radiation from byproduct material to human beings in the practice of dentistry in accordance with a license issued by a State or Territory of the United States, the District of Columbia, or the Commonwealth of Puerto Rico.

"Dentist" means an individual licensed by a State or Territory of the United States, the District of Columbia, or the Commonwealth of Puerto Rico to practice dentistry.

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Diagnostic clinical procedures manual means a collection of written procedures that describes each method (and other instructions and precautions) by which the licensee performs diagnostic clinical procedures, where each diagnostic clinical procedure has been approved by the authorized user and includes the radiopharmaceutical, dosage, and route of administration.

"Management" means the chief executive officer or that person's delegate or delegates.

"Medical institution" means an organization in which several medical disciplines are practiced.

"Medical use" means the intentional internal or external administration of byproduct material, or the radiation therefrom, to human beings in the practice of medicine in accordance with a license issued by a State or Territory of the United States, the District of Columbia, or the Commonwealth of Puerto Rico.

"Ministerial change" means a change that is made, after ascertaining the applicable requirements, by persons in authority in conformance with the requirements and without making a discretionary judgment about whether those requirements should apply in the case at hand.

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Misadministration means the administration of:

(1) A radiopharmaceutical dosage greater than 30 microcuries of either sodium iodide I-125 or I-131:

(i) Involving the wrong patient or wrong radiopharmaceutical, or

(ii) When both the administered dosage differs from the prescribed dosage by more than 20 percent of the prescribed dosage and the difference between the administered dosage and prescribed dosage exceeds 30 microcuries.

(2) A therapeutic radiopharmaceutical dosage, other than sodium iodide I-125 or I-131:

(i) Involving the wrong patient, wrong radiopharmaceutical, or wrong route of administration; or

(ii) When the administered dosage differs from the prescribed dosage by more than 20 percent of the prescribed dosage.

(3) A gamma stereotactic radiosurgery radiation dose:

(i) Involving the wrong patient or wrong treatment site; or

(ii) When the calculated total administered dose differs from the total prescribed dose by more than 10 percent of the total prescribed dose.

(4) A teletherapy radiation dose:

(i) Involving the wrong patient, wrong mode of treatment, or wrong treatment site;

(ii) When the treatment consists of three or fewer fractions and the calculated total administered dose differs from the total prescribed dose by more than 10 percent of the total prescribed dose;

(iii) When the calculated weekly administered dose is 30 percent greater than the weekly prescribed dose; or

(iv) When the calculated total administered dose differs from the total prescribed dose by more than 20 percent of the total prescribed dose.

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(5) A brachytherapy radiation dose:

(i) Involving the wrong patient, wrong radioisotope, or wrong treatment site (excluding, for permanent implants, seeds that were implanted in the correct site but migrated outside the treatment site);

(ii) Involving a sealed source that is leaking;

(iii) When, for a temporary implant, one or more sealed sources are not removed upon completion of the procedure; or

(iv) When the calculated administered dose differs from the prescribed dose by more than 20 percent of the prescribed dose.

(6) A diagnostic radiopharmaceutical dosage, other than quantities greater than 30 microcuries of either sodium iodide I-125 or I-131, both:

(i) Involving the wrong patient, wrong radiopharmaceutical, wrong route of administration, or when the administered dosage differs from the prescribed dosage; and

(ii) When the dose to the patient exceeds 5 rems effective dose equivalent or 50 rems dose equivalent to any individual organ.

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"Mobile nuclear medicine service" means the transportation and medical use of byproduct material.

"Output" means the exposure rate, dose rate, or a quantity related in a known manner to these rates from a teletherapy unit for a specified set of exposure conditions.

"Physician" means a medical doctor or doctor of osteopathy licensed by a State or Territory of the United States, the District of Columbia, or the Commonwealth of Puerto Rico to prescribe drugs in the practice of medicine.

"Podiatric use" means the intentional external administration of the radiation from byproduct material to human beings in the practice of podiatry in accordance with a license issued by a State or Territory of the United States, the District of Columbia, or the Commonwealth of Puerto Rico.

"Podiatrist" means an individual licensed by a State or Territory of the United States, the District of Columbia, or the Commonwealth of Puerto Rico to practice podiatry.

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Prescribed dosage means the quantity of radiopharmaceutical activity as documented:

(1) In a written directive; or

(2) Either in the diagnostic clinical procedures manual or in any appropriate record in accordance with the directions of the authorized user for diagnostic procedures.

Prescribed dose means

(1) For gamma stereotactic radiosurgery, the total dose as documented in the written directive;

(2) For teletherapy, the total dose and dose per fraction as documented in the written directive; or

(3) For brachytherapy, either the total source strength and exposure time or the total dose, as documented in the written directive.

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"Radiation Safety Officer" means the individual identified as the Radiation Safety Officer on a Commission license.

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Recordable event means the administration of:

(1) A radiopharmaceutical or radiation without a written directive where a written directive is required;

(2) A radiopharmaceutical or radiation where a written directive is required without daily recording of each administered radiopharmaceutical dosage or radiation dose in the appropriate record;

(3) A radiopharmaceutical dosage greater than 30 microcuries of either sodium iodide I–125 or I–131 when both:

(i) The administered dosage differs from the prescribed dosage by more than 10 percent of the prescribed dosage, and

(ii) The difference between the administered dosage and prescribed dosage exceeds 15 microcuries;

(4) A therapeutic radiopharmaceutical dosage, other than sodium iodide I–125 or I–131, when the administered dosage differs from the prescribed dosage by more than 10 percent of the prescribed dosage;

(5) A teletherapy radiation dose when the calculated weekly administered dose is 15 percent greater than the weekly prescribed dose; or

(6) A brachytherapy radiation dose when the calculated administered dose differs from the prescribed dose by more than 10 percent of the prescribed dose.

51 FR 36932

"Sealed source" means any byproduct material that is encased in a capsule designed to prevent leakage or escape of the byproduct material.

"Teletherapy physicist" means the individual identified as the teletherapy physicist on a Commission license.

"Visiting authorized user" means an authorized user who is not identified as an authorized user on the license of the licensee being visited.

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Written directive means an order in writing for a specific patient, dated and signed by an authorized user prior to the administration of a radiopharmaceutical or radiation, except as specified in paragraph (6) of this definition, containing the following information:

(1) For any administration of quantities greater than 30 microcuries of either sodium iodide I–125 or I–131: the dosage;

(2) For a therapeutic administration of a radiopharmaceutical other than sodium iodide I–125 or I–131: the radiopharmaceutical, dosage, and route of administration;

(3) For gamma stereotactic radiosurgery: target coordinates, collimator size, plug pattern, and total dose;

(4) For teletherapy: the total dose, dose per fraction, treatment site, and overall treatment period;

(5) For high-dose-rate remote afterloading brachytherapy: the radioisotope, treatment site, and total dose; or

(6) For all other brachytherapy:

(i) Prior to implantation: the radioisotope, number of sources, and source strengths; and

(ii) After implantation but prior to completion of the procedure: the radioisotope, treatment site, and total source strength and exposure time (or, equivalently, the total dose).

51 FR 19240

§ 35.5 Maintenance of records.

Each record required by this part must be legible throughout the retention period specified by each Commission regulation. The record may be the original or a reproduced copy or a microform provided that the copy or microform is authenticated by authorized personnel and that the microform is capable of producing a clear copy throughout the required retention period. The record may also be stored in electronic media with the capability for producing legible, accurate, and complete records during the required retention period. Records such as letters, drawings, specifications, must include all pertinent information such as stamps, initials, and signatures. The licensee shall maintain adequate safeguards against tampering with and loss of records.

51 FR 36932

§ 35.8 Information collection requirements: OMB approval.

(a) The Commission has submitted the information collection requirements contained in this part to the Office of Management and Budget (OMB) for approval as required by the Paperwork Reduction Act of 1980 (44 U.S.C. 3501 et seq.). OMB has approved the information collection requirements in this part under control number 3150–0010.

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(b) The approved information collection requirements contained in this part appear in §§ 35.12, 35.13, 35.14, 35.21, 35.22, 35.23, 35.27, 35.29, 35.31, 35.32, 35.33, 35.50, 35.51, 35.53, 35.59, 35.60, 35.61, 35.70, 35.80, 35.92, 35.204, 35.205, 35.310, 35.315, 35.404, 35.406, 35.410, 35.415, 35.606, 35.610, 35.615, 35.630, 35.632, 35.634, 35.636, 35.641, 35.643, 35.645, and 35.647.

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(c) This part contains information collection requirements in addition to those approved under the control number specified in paragraph (a) of this section. These information collection requirements and the control numbers under which they are approved as follows:

(1) In § 35.12, Form NRC–313 is approved under control number 3150–0120.

§ 35.11 License required.

(a) A person shall not manufacture, produce, acquire, receive, possess, use,

or transfer byproduct material for medical use except in accordance with a specific license issued by the Commission or an Agreement State, or as allowed in paragraph (b) of this section.

(b) An individual may receive, possess, use, or transfer byproduct material in accordance with the regulations in this chapter under the supervision of an authorized user as provided in § 35.25, unless prohibited by license condition.

§ 35.12 Application for license, amendment, or renewal.

(a) If the application is for medical use sited in a medical institution, only the institution's management may apply. If the application is for medical use not sited in a medical institution, any person may apply.

(b) An application for a license for medical use of byproduct material as described in §§ 35.100, 35.200, 35.300, 35.400, and 35.500 of this part must be made by filing an original and one copy of Form NRC-313, "Application for Materials License." For guidance in completing the form, refer to the instructions in the most current versions of the appropriate Regulatory Guides. A request for a license amendment or renewal may be submitted as an original and one copy in letter format.

(c) An application for a license for medical use of byproduct material as described in § 35.600 of this part must be made by filing an original and one copy of Form NRC-313. For guidance in completing the form, refer to the instructions in the most current version of the appropriate Regulatory Guide. A request for a license amendment or renewal may be submitted as an original and one copy in letter format.

(d) For copies of regulatory guides, application forms, or to submit an application or an amendment request, refer to § 30.6 of this chapter.

§ 35.13 License amendments.

A licensee shall apply for and must receive a license amendment:

(a) Before it receives or uses byproduct material for a clinical procedure permitted under this Part but not permitted by the license issued pursuant to this part;

(b) Before it permits anyone, except a visiting authorized user described in § 35.27, to work as an authorized user under the license;

(c) Before it changes Radiation Safety Officers or Teletherapy Physicists;

(d) Before it orders byproduct material in excess of the amount, or radionuclide or form different than authorized on the license; and

(e) Before it adds to or changes the areas of use or address or addresses of use identified in the application or on the license.

§ 35.14 Notifications.

A licensee shall notify the Commission by letter within thirty days when an authorized user, Radiation Safety Officer, or Teletherapy Physicist permanently discontinues performance of duties under the license or has a name change, or when the licensee's mailing address changes. The licensee shall mail the report to the appropriate address as identified in § 30.6 of this chapter.

§ 35.18 License issuance.

The Commission shall issue a license for the medical use of byproduct material for a term of five years if:

(a) The applicant has filed Form NRC-313 "Application for Materials License" in accordance with the instructions in § 35.12;

(b) The applicant has paid any applicable fee as provided in Part 170 of this chapter;

(c) The Commission finds the applicant equipped and committed to observe the safety standards established by the Commission in this Chapter for the protection of the public health and safety; and

(d) The applicant meets the requirements of Part 30 of this chapter.

§ 35.19 Specific exemptions.

The Commission may, upon application of any interested person or upon its own initiative, grant such exemptions from the regulations in this part as it determines are authorized by law and will not endanger life or property or the common defense and security and are otherwise in the public interest. The Commission will review requests for exemptions from training and experience requirements with the assistance of its Advisory Committee on the Medical Uses of Isotopes.

Subpart B—General Administrative Requirements

§ 35.20 ALARA program.

(a) Each licensee shall develop and implement a written radiation protection program that includes provisions for keeping doses ALARA.

(b) To satisfy the requirement of paragraph (a) of this section:

(1) At a medical institution, management, the Radiation Safety Officer, and all authorized users must participate in the program as requested by the Radiation Safety Committee.

(2) For licensees that are not medical institutions, management and all authorized users must participate in the program as requested by the Radiation Safety Officer.

(c) The program must include notice to workers of the program's existence and workers' responsibility to help keep dose equivalents ALARA, a review of summaries of the types and amounts of byproduct material used, occupational doses, changes in radiation safety procedures and safety measures, and continuing education and training for all personnel who work with or in the vicinity of byproduct material. The purpose of the review is to ensure that licensees make a reasonable effort to maintain individual and collective occupational doses ALARA.

§ 35.21 Radiation Safety Officer.

(a) A licensee shall appoint a Radiation Safety Officer responsible for implementing the radiation safety program. The licensee, through the Radiation Safety Officer, shall ensure that radiation safety activities are being performed in accordance with approved procedures and regulatory requirements in the daily operation of the licensee's byproduct material program.

(b) The Radiation Safety Officer shall:

(1) Investigate overexposures, accidents, spills, losses, thefts, unauthorized receipts, uses, transfers, disposals, misadministrations, and other deviations from approved radiation safety practice and implement corrective actions as necessary;

(2) Establish, collect in one binder or file, and implement written policy and procedures for:

(i) Authorizing the purchase of byproduct material;

(ii) Receiving and opening packages of byproduct material;

(iii) Storing byproduct material;

(iv) Keeping an inventory record of byproduct material;

(v) Using byproduct material safely;

(vi) Taking emergency action if control of byproduct material is lost;

(vii) Performing periodic radiation surveys;

(viii) Performing checks of survey instruments and other safety equipment;

(ix) Disposing of byproduct material;

(x) Training personnel who work in or frequent areas where byproduct material is used or stored;

(xi) Keeping a copy of all records and reports required by the Commission regulations, a copy of these regulations, a copy of each licensing request and license and amendments, and the written policy and procedures required by the regulations.

(3) Brief management once each year on the byproduct material program;

(4) Establish personnel exposure investigational levels that, when exceeded, will initiate an investigation by the Radiation Safety Officer of the cause of the exposure;

56 FR 34932

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(5) Establish personnel exposure investigational levels that, when exceeded, will initiate a prompt investigation by the Radiation Safety Officer of the cause of the exposure and a consideration of actions that might be taken to reduce the probability of recurrence;

(6) For medical use not at a medical institution, approve or disapprove minor changes in radiation safety procedures that are not potentially important to safety with the advice and consent of management; and

(7) For medical use at a medical institution, assist the Radiation Safety Committee in the performance of its duties.

§ 35.22 Radiation Safety Committee.

Each medical institution licensee shall establish a Radiation Safety Committee to oversee the use of byproduct material.

(a) Each Committee must meet the following administrative requirements:

(1) Membership must consist of at least three individuals and must include an authorized user of each type of use permitted by the license, the Radiation Safety Officer, a representative of the nursing service, and a representative of management who is neither an authorized user nor a Radiation Safety Officer. Other members may be included as the licensee deems appropriate.

(2) The Committee must meet at least quarterly.

(3) To establish a quorum and to conduct business, at least one-half of the Committee's membership must be present, including the Radiation Safety Officer and the management's representative.

(4) The minutes of each Radiation Safety Committee meeting must include:

(i) The date of the meeting;

(ii) Members present;

(iii) Members absent;

(iv) Summary of deliberations and discussions;

(v) Recommended actions and the numerical results of all ballots; and

(vi) ALARA program reviews described in § 35.20(c).

(5) The Committee must promptly provide each member with a copy of the meeting minutes, and retain one copy for the duration of the license.

(b) To oversee the use of licensed material, the Committee must:

(1) Review recommendations on ways to maintain individual and collective doses ALARA;

(2) Review, on the basis of safety and with regard to the training and experience standards in Subpart J of this part, and approve or disapprove any individual who is to be listed as an authorized user, the Radiation Safety Officer, or a Teletherapy Physicist before submitting a license application or request for amendment or renewal;

(3) Review on the basis of safety, and approve with the advice and consent of the Radiation Safety Officer and the management representative, or disapprove minor changes in radiation safety procedures that are not potentially important to safety and are permitted under § 35.31 of this Part;

(4) Review quarterly, with the assistance of the Radiation Safety Officer, a summary of the occupational radiation dose records of all personnel working with byproduct material;

(5) Review quarterly, with the assistance of the Radiation Safety Officer, all incidents involving byproduct material with respect to cause and subsequent actions taken; and

(6) Review annually, with the assistance of the Radiation Safety Officer, the radiation safety program.

§ 35.23 Statements of authority and responsibilities.

(a) A licensee shall provide the Radiation Safety Officer, and at a medical institution the Radiation Safety Committee, sufficient authority, organizational freedom, and management prerogative, to:

(1) Identify radiation safety problems;

(2) Initiate, recommend, or provide corrective actions; and

(3) Verify implementation of corrective actions.

(b) A licensee shall establish and state in writing the authorities, duties, responsibilities, and radiation safety activities of the Radiation Safety Officer, and at a medical institution the Radiation Safety Committee, and retain the current edition of these statements as a record until the Commission terminates the license.

§ 35.25 Supervision.

(a) A licensee that permits the receipt, possession, use, or transfer of byproduct material by an individual under the supervision of an authorized user as allowed by § 35.11(b) of this part shall:

(1) Instruct the supervised individual in the principles of radiation safety appropriate to that individual's use of byproduct material and in the licensee's written quality management program;

(2) Require the supervised individual to follow the instructions of the supervising authorized user, follow the written radiation safety and quality management procedures established by the licensee, and comply with the regulations of this chapter and the license conditions with respect to the use of byproduct material; and

(3) Periodically review the supervised individual's use of byproduct material and the records kept to reflect this use.

(b) A licensee that supervises an individual is responsible for the acts and omissions of the supervised individual.

§ 35.27 Visiting authorized user.

(a) A licensee may permit any visiting authorized user to use licensed material for medical use under the terms of the licensee's license for sixty days each year if:

(1) The visiting authorized user has the prior written permission of the licensee's management and, if the use occurs on behalf of an institution, the institution's Radiation Safety Committee;

(2) The licensee has a copy of a license issued by the Commission or an Agreement State, or a permit issued by a Commission or Agreement State broad licensee that is authorized to permit medical use, that identifies the visiting authorized user by name as an authorized user for medical use; and

(3) Only those procedures for which the visiting authorized user is specifically authorized by the license or permit are performed by that individual.

(b) A licensee need not apply for a license amendment in order to permit a visiting authorized user to use licensed material as described in paragraph (a) of this section.

(c) A licensee shall retain the records specified in this section for three years after the visiting authorized user's last use of licensed material, but may discard the records if the visiting authorized user has been listed as an authorized user on the licensee's license.

§ 35.29 Administrative requirements that apply to the provision of mobile nuclear medicine service.

(a) The Commission will license mobile nuclear medicine service only in accordance with Subparts D, E and H of this part and § 31.11 of this chapter.

(b) Mobile nuclear medicine service licensees shall obtain a letter signed by the management of each client for which services are rendered that authorizes use of byproduct material at the client's address of use. The mobile nuclear medicine service licensee shall retain the letter for three years after the last provision of service.

(c) If a mobile nuclear medicine service provides services that the client is also authorized to provide, the client is responsible for assuring that services are conducted in accordance with the regulations in this chapter while the mobile nuclear medicine service is under the client's direction.

(d) A mobile nuclear medicine service may not order byproduct material to be delivered directly from the manufacturer or distributor to the client's address of use.

§ 35.31 Radiation safety program changes.

(a) A licensee may make minor changes in radiation safety procedures that are not potentially important to safety, i.e., ministerial changes, that were described in the application for license, renewal, or amendment except for those changes in §§ 35.13 and 35.606 of this part. Examples of such ministerial changes include: editing of procedures for clarity or conformance with local drafting policy or updating names, telephone numbers, and addresses; adoption of model radiation safety procedures published in NRC Regulatory Guides; replacement of equipment; reassignment of tasks among employees; or assignment of service contracts for services such as personnel dosimetry, radiation safety equipment repair or calibration, waste disposal, and safety surveys. A licensee is responsible for assuring that any change made is in compliance with the requirements of the regulations and the license.

(b) A licensee shall retain a record of each change until the license has been renewed or terminated. The record must include the effective date of the change, a copy of the old and new radiation safety procedures, the reason for the change, a summary of radiation safety matters that were considered before making the change, the signature of the Radiation Safety Officer, and the signatures of the affected authorized users and of management or, in a medical institution, the Radiation Safety Committee's chairman and the management representative.

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§ 35.32 Quality management program.

(a) Each applicant or licensee under this part, as applicable, shall establish and maintain a written quality management program to provide high confidence that byproduct material or radiation from byproduct material will be administered as directed by the authorized user. The quality management program must include written policies and procedures to meet the following specific objectives:

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(1) That, prior to administration, a written directive [1] is prepared for:

(i) Any teletherapy radiation dose;

(ii) Any gamma stereotactic radiosurgery radiation dose;

(iii) Any brachytherapy radiation dose;

(iv) Any administration of quantities greater than 30 microcuries of either sodium iodide I–125 or I–131; or

(v) Any therapeutic administration of a radiopharmaceutical, other than sodium iodide I–125 or I–131;

(2) That, prior to each administration, the patient's identity is verified by more than one method as the individual named in the written directive;

(3) That final plans of treatment and related calculations for brachytherapy, teletherapy, and gamma stereotactic radiosurgery are in accordance with the respective written directives;

(4) That each administration is in accordance with the written directive; and

(5) That any unintended deviation from the written directive is identified and evaluated, and appropriate action is taken.

(b) The licensee shall:

(1) Develop procedures for and conduct a review of the quality management program including, since the last review, an evaluation of:

(i) A representative sample of patient administrations,

(ii) All recordable events, and

(iii) All misadministrations

to verify compliance with all aspects of the quality management program; these reviews shall be conducted at intervals no greater than 12 months;

(2) Evaluate each of these reviews to determine the effectiveness of the quality management program and, if required, make modifications to meet the objectives of paragraph (a) of this section; and

(3) Retain records of each review, including the evaluations and findings of the review, in an auditable form for three years.

(c) The licensee shall evaluate and respond, within 30 days after discovery of the recordable event, to each recordable event by:

(1) Assembling the relevant facts including the cause;

(2) Identifying what, if any, corrective action is required to prevent recurrence; and

(3) Retaining a record, in an auditable form, for three years, of the relevant facts and what corrective action, if any, was taken.

(d) The licensee shall retain:

(1) Each written directive; and

(2) A record of each administered radiation dose or radiopharmaceutical dosage where a written directive is required in paragraph (a)(1) above, in an auditable form, for three years after the date of administration.

(e) The licensee may make modifications to the quality management program to increase the program's efficiency provided the program's effectiveness is not decreased. The licensee shall furnish the modification to the appropriate NRC Regional Office within 30 days after the modification has been made.

(f)(1) Each applicant for a new license, as applicable, shall submit to the appropriate NRC Regional Office in accordance with 10 CFR 30.6 a quality management program as part of the application for a license and implement the program upon issuance of the license by the NRC.

(2) Each existing licensee, as applicable, shall submit to the appropriate NRC Regional Office in accordance with 10 CFR 30.6 by January 27, 1992 a written certification that the quality management program has been implemented along with a copy of the program.

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[1] If, because of the patient's condition, a delay in order to provide a written revision to an existing written directive would jeopardize the patient's health, an oral revision to an existing written directive will be acceptable, provided that the oral revision is documented immediately in the patient's record and a revised written directive is signed by the authorized user within 48 hours of the oral revision.

Also, a written revision to an existing written directive may be made for any diagnostic or therapeutic procedure provided that the revision is dated and signed by an authorized user prior to the administration of the radiopharmaceutical dosage, the brachytherapy dose, the gamma stereotactic radiosurgery dose, the teletherapy dose, or the next teletherapy fractional dose.

If, because of the emergent nature of the patient's condition, a delay in order to provide a written directive would jeopardize the patient's health, an oral directive will be acceptable, provided that the information contained in the oral directive is documented immediately in the patient's record and a written directive is prepared within 24 hours of the oral directive.

§ 35.33 Notifications, reports, and records of misadministrations.

(a) For a misadministration:

(1) The licensee shall notify by telephone the NRC Operations Center [3] no later than the next calendar day after discovery of the misadministration.

(2) The licensee shall submit a written report to the appropriate NRC Regional Office listed in 10 CFR 30.6 within 15 days after discovery of the misadministration. The written report must include the licensee's name; the prescribing physician's name; a brief description of the event; why the event occurred; the effect on the patient; what improvements are needed to prevent recurrence; actions taken to prevent recurrence; whether the licensee notified the patient, or the patient's responsible relative or guardian (this person will be subsequently referred to as "the patient" in this section), and if not, why not, and if the patient was notified, what information was provided to the patient. The report must not include the patient's name or other information that could lead to identification of the patient.

(3) The licensee shall notify the referring physician and also notify the patient of the misadministration no later than 24 hours after its discovery, unless the referring physician personally informs the licensee either that he will inform the patient or that, based on medical judgment, telling the patient would be harmful. The licensee is not required to notify the patient without first consulting the referring physician. If the referring physician or patient cannot be reached within 24 hours, the licensee shall notify the patient as soon as possible thereafter. The licensee may not delay any appropriate medical care for the patient, including any necessary remedial care as a result of the misadministration, because of any delay in notification.

(4) If the patient was notified, the licensee shall also furnish, within 15 days after discovery of the misadministration, a written report to the patient by sending either:

(i) A copy of the report that was submitted to the NRC; or

(ii) A brief description of both the event and the consequences as they may affect the patient, provided a statement is included that the report submitted to the NRC can be obtained from the licensee.

[3] The commercial telephone number of the NRC Operations Center is (301) 951-0550.

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(b) Each licensee shall retain a record of each misadministration for five years. The record must contain the names of all individuals involved (including the prescribing physician, allied health personnel, the patient, and the patient's referring physician), the patient's social security number or identification number if one has been assigned, a brief description of the misadministration, why it occurred, the effect on the patient, what improvements are needed to prevent recurrence, and the actions taken to prevent recurrence.

(c) Aside from the notification requirement, nothing in this section affects any rights or duties of licensees and physicians in relation to each other, patients, or the patient's responsible relatives or guardians.

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§ 35.49 Suppliers.

A licensee may use for medical use only:

(a) Byproduct material manufactured, labeled, packaged, and distributed in accordance with a license issued pursuant to the regulations in Part 30 and §§ 32.72, 32.73, or 32.74 of this chapter or the equivalent regulations of an Agreement State;

(b) Reagent kits that have been manufactured, labeled, packaged, and distributed in accordance with an approval by the Commission pursuant to § 32.73 or an Agreement State under equivalent regulations for the preparation of radiopharmaceuticals for medical use; and

(c) Teletherapy sources manufactured and distributed in accordance with a license issued pursuant to Part 30 of this chapter or the equivalent regulations of an Agreement State.

Subpart C—General Technical Requirements

§ 35.50 Possession, use, calibration, and check of dose calibrators.

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(a) A medical use licensee authorized to administer radiopharmaceuticals shall have in its possession a dose calibrator and use it to measure the amount of activity administered to each patient.

(b) A licensee shall:

(1) Check each dose calibrator for constancy with a dedicated check source at the beginning of each day of use. To satisfy the requirement of this paragraph, the check must be done on a frequently used setting with a sealed source of not less than 10 microcuries of radium-226 or 50 microcuries of any other photon-emitting radionuclide;

(2) Test each dose calibrator for accuracy upon installation and at least annually thereafter by assaying at least two sealed sources containing different radionuclides whose activity the manufacturer has determined within 5 percent of its stated activity, whose activity is at least 10 microcuries for radium-226 and 50 microcuries for any other photon-emitting radionuclide, and at least one of which has a principal photon energy between 100 keV and 500 keV;

(3) Test each dose calibrator for linearity upon installation and at least quarterly thereafter over the range of its use between the highest dosage that will be administered to a patient and 10 microcuries; and

(4) Test each dose calibrator for geometry dependence upon installation over the range of volumes and volume

configurations for which it will be used. The licensee shall keep a record of this test for the duration of the use of the dose calibrator.

(c) A licensee shall also perform appropriate checks and tests required by this section following adjustment or repair of the dose calibrator.

(d) A licensee shall mathematically correct dosage readings for any geometry or linearity error that exceeds 10 percent if the dosage is greater than 10 microcuries and shall repair or replace the dose calibrator if the accuracy or constancy error exceeds 10 percent.

(e) A licensee shall retain a record of each check and test required by this section for three years unless directed otherwise. The records required in paragraphs (b)(1) through (b)(4) of this section must include:

(1) For paragraph (b)(1), the model and serial number of the dose calibrator, the identity of the radionuclide contained in the check source, the date of the check, the activity measured, and the initials of the individual who performed the check;

(2) For paragraph (b)(2), the model and serial number of the dose calibrator, the model and serial number of each source used and the identity of the radionuclide contained in the source and its activity, the date of the test, the results of the test, and the signature of the Radiation Safety Officer;

(3) For paragraph (b)(3), the model and serial number of the dose calibrator, the calculated activities, the measured activities, the date of the test, and the signature of the Radiation Safety Officer; and

(4) For paragraph (b)(4), the model and serial number of the dose calibrator, the configuration of the source measured, the activity measured for each volume measured, the date of the test, and the signature of the Radiation Safety Officer.

§ 35.51 Calibration and check of survey instruments.

(a) A licensee shall calibrate the survey instruments used to show compliance with this part before first use, annually, and following repair. The licensee shall:

(1) Calibrate all scales with readings up to 1000 millirem per hour with a radiation source;

(2) Calibrate two separated readings on each scale that must be calibrated; and

(3) Conspicuously note on the instrument the apparent exposure rate from a dedicated check source as determined at the time of calibration, and the date of calibration.

(b) When calibrating a survey instrument, the licensee shall consider a point as calibrated if the indicated exposure rate differs from the calculated exposure rate by not more than 20 percent, and shall conspicuously attach a correction chart or graph to the instrument.

(c) A licensee shall check each survey instrument for proper operation with the dedicated check source each day of use. A licensee is not required to keep records of these checks.

(d) A licensee shall retain a record of each survey instrument calibration for three years. The record must include:

(1) A description of the calibration procedure; and

(2) The date of the calibration, a description of the source used and the certified exposure rates from the source, and the rates indicated by the instrument being calibrated, the correction factors deduced from the calibration data, and the signature of the individual who performed the calibration.

§ 35.53 Measurement of radiopharmaceutical dosages.

A licensee shall:

(a) Measure the activity of each radiopharmaceutical dosage that contains more than 10 microcuries of a photon-emitting radionuclide before medical use;

(b) Measure the activity of each radiopharmaceutical dosage with a desired activity of 10 microcuries or less of a photon-emitting radionuclide before medical use to verify that the dosage does not exceed 10 microcuries;

(c) Retain a record of the measurements required by this section for three years. To satisfy this requirement, the record must contain the:

(1) Generic name, trade name, or abbreviation of the radiopharmaceutical, its lot number, and expiration dates and the radionuclide;

(2) Patient's name, and identification number if one has been assigned;

(3) Prescribed dosage and activity of the dosage at the time of measurement, or a notation that the total activity is less than 10 microcuries;

(4) Date and time of the measurement; and

(5) Initials of the individual who made the record.

§ 35.57 Authorization for calibration and reference sources.

Any person authorized by § 35.11 of this Part for medical use of byproduct material may receive, possess, and use the following byproduct material for check, calibration, and reference use:

(a) Sealed sources manufactured and distributed by a person licensed pursuant to § 32.74 of this chapter or equivalent Agreement State regulations and that do not exceed 15 millicuries each;

(b) Any byproduct material listed in §§ 35.100 or 35.200 with a half-life not longer than 100 days in individual amounts not to exceed 15 millicuries;

(c) Any byproduct material listed in §§ 35.100 or 35.200 with a half-life longer than 100 days in individual amounts not to exceed 200 microcuries each; and

(d) Technetium-99m in individual amounts not to exceed 50 millicuries.

§ 35.59 Requirements for possession of sealed sources and brachytherapy sources.

(a) A licensee in possession of any sealed source or brachytherapy source shall follow the radiation safety and handling instructions supplied by the manufacturer, and shall maintain the instructions for the duration of source use in a legible form convenient to users.

(b) A licensee in possession of a sealed source shall:

(1) Test the source for leakage before its first use unless the licensee has a certificate from the supplier indicating that the source was tested within six months before transfer to the licensee; and

(2) Test the source for leakage at intervals not to exceed six months or at other intervals approved by the Commission or an Agreement State and described in the label or brochure that accompanies the source.

(c) To satisfy the leak test requirements of this section, the licensee must:

(1) Take a wipe sample from the sealed source or from the surfaces of the device in which the sealed source is mounted or stored on which radioactive contamination might be expected to accumulate or wash the source in a small volume of detergent solution and treat the entire volume as the sample;

(2) Take teletherapy and other device source test samples when the source is in the "off" position; and

(3) Measure the sample so that the leakage test can detect the presence of 0.005 microcuries of radioactive material on the sample.

(d) A licensee shall retain leakage test records for five years. The records must contain the model number, and serial number if assigned, of each source tested, the identity of each source radionuclide and its estimated activity, the measured activity of each test sample expressed in microcuries, a description of the method used to measure each test sample, the date of the test, and the signature of the Radiation Safety Officer.

(e) If the leakage test reveals the presence of 0.005 microcurie or more of removable contamination, the licensee shall:

(1) Immediately withdraw the sealed source from use and store it in accordance with the requirements in Parts 20 and 30 of this chapter; and

(2) File a report within five days of the leakage test with the appropriate NRC Office listed in § 30.6 of this chapter, with a copy to Director, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555, describing the equipment involved, the test results, and the action taken.

(f) A licensee need not perform a leakage test on the following sources:

(1) Sources containing only byproduct material with a half-life of less than 30 days;

(2) Sources containing only byproduct material as a gas;

(3) Sources containing 100 microcuries or less of beta or gamma-emitting material or 10 microcuries or less of alpha-emitting material;

(4) Sources stored and not being used. The licensee shall, however, test each such source for leakage before any use or transfer unless it has been leakage-tested within six months before the date of use or transfer; and

(5) Seeds of iridium-192 encased in nylon ribbon.

(g) A licensee in possession of a sealed source or brachytherapy source shall conduct a quarterly physical inventory of all such sources in its possession. The licensee shall retain each inventory record for five years. The inventory records must contain the model number of each source, and serial number if one has been assigned, the identity of each source radionuclide and its nominal activity, the location of each source, and the signature of the Radiation Safety Officer.

(h) A licensee in possession of a sealed source or brachytherapy source shall measure the ambient dose rates quarterly in all areas where such sources are stored. This does not apply to teletherapy sources in teletherapy units or sealed sources in diagnostic devices.

(i) A licensee shall retain a record of each survey required in paragraph (h) of this section for three years. The record must include the date of the survey, a plan of each area that was surveyed, the measured dose rate at several points in each area expressed in millirem per hour, the survey instrument used, and the signature of the Radiation Safety Officer.

§ 35.60 Syringe shields and labels.

(a) A licensee shall keep syringes that contain byproduct material to be administered in a radiation shield.

(b) To identify its contents, a licensee shall conspicuously label each syringe, or syringe radiation shield that contains a syringe with a radiopharmaceutical. The label must show the radiopharmaceutical name or its abbreviation, the clinical procedure to be performed, or the patient's name.

(c) A licensee shall require each individual who prepares a radiopharmaceutical kit to use a syringe radiation shield when preparing the kit and shall require each individual to use a syringe radiation shield when administering a radiopharmaceutical by injection unless the use of the shield is contraindicated for that patient.

§ 35.61 Vial shields and labels.

(a) A licensee shall require each individual preparing or handling a vial that contains a radiopharmaceutical to keep the vial in a vial radiation shield.

(b) To identify its contents, a licensee shall conspicuously label each vial radiation shield that contains a vial of a radiopharmaceutical. The label must show the radiopharmaceutical name or its abbreviation.

§ 35.70 Surveys for contamination and ambient radiation exposure rate.

(a) A licensee shall survey with a radiation detection survey instrument at the end of each day of use all areas where radiopharmaceuticals are routinely prepared for use or administered.

(b) A licensee shall survey with a radiation detection survey instrument at least once each week all areas where radiopharmaceuticals or radiopharmaceutical waste is stored.

(c) A licensee shall conduct the surveys required by paragraphs (a) and (b) of this section so as to be able to detect dose rates as low as 0.1 millirem per hour.

(d) A licensee shall establish radiation dose rate trigger levels for the surveys required by paragraphs (a) and (b) of this section. A licensee shall require that the individual performing the survey immediately notify the Radiation Safety Officer if a dose rate exceeds a trigger level.

(e) A licensee shall survey for removable contamination once each week all areas where radiopharmaceuticals are routinely prepared for use, administered, or stored.

(f) A licensee shall conduct the surveys required by paragraph (e) of this section so as to be able to detect contamination on each wipe sample of 2000 disintegrations per minute.

(g) A licensee shall establish removable contamination trigger levels for the surveys required by paragraph (e) of this section. A licensee shall require that the individual performing the survey immediately notify the Radiation Safety Officer if contamination exceeds the trigger level.

(h) A licensee shall retain a record of each survey for three years. The record must include the date of the survey, a plan of each area surveyed, the trigger level established for each area, the detected dose rate at several points in each area expressed in millirem per hour or the removable contamination in each area expressed in disintegrations per minute per 100 square centimeters, the instrument used to make the survey or analyze the samples, and the initials of the individual who performed the survey.

§ 35.75 Release of patients containing radiopharmaceuticals or permanent implants.

(a) A licensee may not authorize release from confinement for medical care any patient administered a radiopharmaceutical until either:

(1) The measured dose rate from the patient is less than 5 millirems per hour at a distance of one meter; or

(2) The activity in the patient is less than 30 millicuries.

(b) A licensee may not authorize release from confinement for medical care of any patient administered a permanent implant until the measured dose rate from the patient is less than 5 millirems per hour at a distance of one meter.

§ 35.80 Technical requirements that apply to the provision of mobile nuclear medicine service.

A licensee providing mobile nuclear medicine service shall:

(a) Transport to each address of use only syringes or vials containing prepared radiopharmaceuticals or radiopharmaceuticals that are intended for reconstitution of radiopharmaceutical kits;

(b) Bring into each address of use all byproduct material to be used and, before leaving, remove all unused byproduct material and all associated waste;

(c) Secure or keep under constant surveillance and immediate control all byproduct material when in transit or at an address of use;

(d) Check survey instruments and dose calibrators as described in §§ 35.50 and 35.51, and check all other transported equipment for proper function before medical use at each address of use;

(e) Carry a radiation detection survey meter in each vehicle that is being used to transport byproduct material, and, before leaving a client address of use, survey all radiopharmaceutical areas of

use with a radiation detection survey meter to ensure that all radiopharmaceuticals and all associated waste have been removed.

(f) Retain a record of each survey required in paragraph (e) of this section for three years. The record must include the date of the survey, a plan of each area that was surveyed, the measured dose rate at several points in each area of use expressed in millirem per hour, the instrument used to make the survey, and the initials of the individual who performed the survey.

§ 35.90 Storage of volatiles and gases.

A licensee shall store volatile radiopharmaceuticals and radioactive gases in the shipper's radiation shield and container. A licensee shall store a multi-dose container in a fume hood after drawing the first dosage from it.

§ 35.92 Decay-in-storage.

(a) A licensee may hold byproduct material with a physical half-life of less than 65 days for decay-in-storage before disposal in ordinary trash and is exempt from the requirements of § 20.301 or, for licensees implementing the provisions of §§ 20.1001–20.2401, § 20.2001 of this chapter if it:

(1) Holds byproduct material for decay a minimum of ten half-lives;

(2) Monitors byproduct material at the container surface before disposal as ordinary trash and determines that its radioactivity cannot be distinguished from the background radiation level with a radiation detection survey meter set on its most sensitive scale and with no interposed shielding;

(3) Removes or obliterates all radiation labels; and

(4) Separates and monitors each generator column individually with all radiation shielding removed to ensure that it has decayed to background radiation level before disposal.

(b) A licensee shall retain a record of each disposal permitted under paragraph (a) of this section for three years. The record must include the date of the disposal, the date on which the byproduct material was placed in storage, the radionuclides disposed, the survey instrument used, the background dose rate, the dose rate measured at the surface of each waste container, and the name of the individual who performed the disposal.

Subpart D—Uptake, Dilution, and Excretion

§ 35.100 Use of radiopharmaceuticals for uptake, dilution and excretion studies.

A licensee may use any byproduct material in a radiopharmaceutical and for a diagnostic use involving measurements of uptake, dilution, or excretion for which the Food and Drug Administration (FDA) has accepted a "Notice of Claimed Investigational Exemption for a New Drug" (IND) or approved a "New Drug Application" (NDA).

§ 35.120 Possession of survey instrument.

A licensee authorized to use byproduct material for uptake, dilution, and excretion studies shall have in its possession a portable radiation detection survey instrument capable of detecting dose rates over the range 0.1 millirem per hour to 100 millirem per hour.

Subpart E—Imaging and Localization

§ 35.200 Use of radiopharmaceuticals, generators, and reagent kits for imaging and localization studies.

(a) A licensee may use any byproduct material in a diagnostic radiopharmaceutical or any generator or reagent kit for preparation and diagnostic use of a radiopharmaceutical containing byproduct material for which the Food and Drug Administration has accepted a "Notice of Claimed Investigational Exemption for a New Drug" (IND) or approved a "New Drug Application" (NDA).

(b) A licensee shall elute generators and prepare reagent kits in accordance with the manufacturer's instructions.

(c)(1) From August 23, 1990, to August 23, 1993, a licensee may depart from the manufacturer's instructions for eluting generators and preparing reagent kits for which FDA has approved an NDA, provided that the licensee has a written directive made by an authorized user physician that directs a specific departure for a particular patient, or patients, or for a radiopharmaceutical, and which includes the specific nature of the departure, a precise description of the departure, and a brief statement of the reasons why the departure from the manufacturer's instructions for preparing the radiopharmaceutical would obtain medical results not otherwise attainable or would reduce medical risks to particular patients because of their medical condition. If the authorized user physician determines that a delay in preparing the radiopharmaceutical in order to make a written directive would jeopardize the patient's health because of the emergency nature of the patient's medical condition, the radiopharmaceutical may be prepared without first making a written directive. The authorized user physician shall make notation of this determination in the written directive within 3 working days after the prescribed departure.

(2) The licensee shall keep the written directive and a record of the number of patient administrations under the departure in an auditable form and available for inspection for a period of 5 years.

(3) Nothing in this section relieves the licensee from complying with other applicable NRC, FDA, and other Federal or State regulations governing the elution of generators and preparation of reagent kits.

§ 35.204 Permissible molybdenum-99 concentration.

(a) A licensee may not administer to humans a radiopharmaceutical containing more than 0.15 microcurie of molybdenum-99 per millicurie of technetium-99m.

(b) A licensee that uses molybdenum-99/technetium-99m generators for preparing a technetium-99m radiopharmaceutical shall measure the molybdenum-99 concentration in each eluate or extract.

(c) A licensee that must measure molybdenum concentration shall retain a record of each measurement for three years. The record must include, for each elution or extraction of technetium-99m, the measured activity of the technetium expressed in millicuries, the measured activity of the molybdenum expressed in microcuries, the ratio of the measures expressed as microcuries of molybdenum per millicurie of technetium, the time and date of the measurement, and the initials of the individual who made the measurement.

§ 35.205 Control of aerosols and gases.

(a) A licensee that administers radioactive aerosols or gases shall do so in a room with a system that will keep airborne concentrations within the limits prescribed by §§ 20.103 and 20.106 of this chapter. The system must either be directly vented to the atmosphere through an air exhaust or provide for collection and decay or disposal of the aerosol or gas in a shielded container.

(b) A licensee shall administer radioactive gases only in rooms that are at negative pressure compared to surrounding rooms.

(c) Before receiving, using, or storing a radioactive gas, the licensee shall calculate the amount of time needed after a spill to reduce the concentration in the room to the occupational limit listed in Appendix B to Part 20 of this chapter. The calculation must be based on the highest activity of gas handled in a single container, the air volume of the room, and the measured available air exhaust rate.

(d) A licensee shall make a record of the calculations required in paragraph (c) of this section that includes the assumptions, measurements, and

51 FR 36932

calculations made and shall retain the record for the duration of use of the area. A licensee shall also post the calculated time and safety measures to be instituted in case of a spill at the area of use.

51 FR 36932

§ 35.220 Possession of survey instruments.

A licensee authorized to use byproduct material for imaging and localization studies shall have in its possession a portable radiation detection survey instrument capable of detecting dose rates over the range of 0.1 millirem per hour to 100 millirem per hour, and a portable radiation measurement survey instrument capable of measuring dose rates over the range 1 millirem per hour to 1000 millirem per hour.

Subpart F—Radiopharmaceuticals for Therapy

55 FR 34513

§ 35.300 Use of radiopharmaceuticals for therapy.

(a) A licensee may use any byproduct material in a radiopharmaceutical and for a therapeutic use for which the Food and Drug Administration has accepted a "Notice of Claimed Investigational Exemption for a New Drug" (IND), or approved a "New Drug Application" (NDA). The licensee shall comply with the package insert instructions regarding indications and method of administration.

(b)(1) From August 23, 1990, to August 23, 1993, a licensee may depart from the package insert instructions regarding indications or method of administration for a radiopharmaceutical for which FDA has approved an NDA, provided that the authorized user physician makes a record of the departure which includes the specific nature of the departure and a brief statement of the reasons why the departure would obtain medical results not otherwise attainable or would reduce medical risks to particular patients because of their medical condition. Licensees are not authorized to depart from the manufacturer's instructions for eluting a generator or preparing any kit for a radiopharmaceutical for therapy.

(2) The licensee shall obtain this record within 3 working days of the administration and keep this record and a record of the number of patient administrations under the departure in an auditable form and available for inspection for 5 years.

(c) Nothing in this section relieves the licensee from complying with other applicable NRC, FDA (including requirements governing the submission of an IND), and other Federal or State regulations governing the use of radiopharmaceuticals for therapy.

53 FR 27665

(e) A licensee shall check the operation of reusable collection systems each month, and measure the ventilation rates available in areas of radioactive gas use each six months.

§ 35.310 Safety instruction.

(a) A licensee shall provide radiation safety instruction for all personnel caring for the patient receiving radiopharmaceutical therapy and

hospitalized for compliance with § 35.75 of this chapter. To satisfy this requirement, the instruction must describe the licensee's procedures for:

(1) Patient control;

(2) Visitor control;

(3) Contamination control;

(4) Waste control; and

(5) Notification of the Radiation Safety Officer in case of the patient's death or medical emergency.

(b) A licensee shall keep for three years a list of individuals receiving instruction required by paragraph (a) of this section, a description of the instruction, the date of instruction, and the name of the individual who gave the instruction.

§ 35.315 Safety precautions.

(a) For each patient receiving radiopharmaceutical therapy and hospitalized for compliance with § 35.75 of this chapter, a licensee shall:

(1) Provide a private room with a private sanitary facility;

(2) Post the patient's door with a "Radioactive Materials" sign and note on the door or in the patient's chart where and how long visitors may stay in the patient's room;

(3) Authorize visits by individuals under age 18 only on a patient-by-patient basis with the approval of the authorized user after consultation with the Radiation Safety Officer;

(4) Promptly after administration of the dosage, measure the dose rates in contiguous restricted and unrestricted areas with a radiation measurement survey instrument to demonstrate compliance with the requirements of Part 20 of this chapter, and retain for three years a record of each survey that includes the time and date of the survey, a plan of the area or list of points surveyed, the measured dose rate at several points expressed in millirem per hour, the instrument used to make the survey, and the initials of the individual who made the survey;

(5) Either monitor material and items removed from the patient's room to determine that their radioactivity cannot be distinguished from the natural background radiation level with a radiation detection survey instrument set on its most sensitive scale and with no interposed shielding, or handle them as radioactive waste;

(6) Provide the patient with radiation safety guidance that will help to keep radiation dose to household members and the public as low as reasonably achievable before authorizing release of the patient;

(7) Survey the patient's room and private sanitary facility for removable contamination with a radiation detection survey instrument before assigning another patient to the room. The room must not be reassigned until removable contamination is less than 200 disintegrations per minute per 100 square centimeters; and

(8) Measure the thyroid burden of each individual who helped prepare or administer a dosage of iodine-131 within three days after administering the dosage, and retain for the period required by § 20.401(c)(1) of this chapter or, for licensees implementing the provisions of §§ 20.1001–20.2401, § 20.2106(a) of this chapter a record of each thyroid burden measurement, its date, the name of the individual whose thyroid burden was measured, and the initials of the individual who made the measurements.

(b) A licensee shall notify the Radiation Safety Officer immediately if the patient dies or has a medical emergency.

§ 35.320 Possession of survey instruments.

A licensee authorized to use byproduct material for radiopharmaceutical therapy shall have in its possession a portable radiation detection survey instrument capable of detecting dose rates over the range 0.1 millirem per hour to 100 millirem per hour, and a portable radiation measurement survey instrument capable of measuring dose rates over the range 1 millirem per hour to 1000 millirem per hour.

Subpart G—Sources for Brachytherapy

§ 35.400 Use of sources for brachytherapy.

A licensee shall use the following sources in accordance with the manufacturer's radiation safety and handling instructions:

(a) Cesium-137 as a sealed source in needles and applicator cells for topical, interstitial, and intracavitary treatment of cancer;

(b) Cobalt-60 as a sealed source in needles and applicator cells for topical, interstitial, and intracavitary treatment of cancer;

(c) Gold-198 as a sealed source in seeds for interstitial treatment of cancer;

(d) Iridium-192 as seeds encased in nylon ribbon for interstitial treatment of cancer;

(e) Strontium-90 as a sealed source in an applicator for treatment of superficial eye conditions; and

(f) Iodine-125 as a sealed source in seeds for interstitial treatment of cancer.

(g) Palladium-103 as a sealed source in seeds for interstitial treatment of cancer.

§ 35.404 Release of patients treated with temporary implants.

(a) Immediately after removing the last temporary implant source from a patient, the licensee shall make a radiation survey of the patient with a radiation detection survey instrument to confirm that all sources have been removed. The licensee may not release from confinement for medical care a patient treated by temporary implant until all sources have been removed.

(b) A licensee shall retain a record of patient surveys for three years. Each record must include the date of the survey, the name of the patient, the dose rate from the patient expressed as millirem per hour and measured at one meter from the patient, the survey instrument used, and the initials of the individual who made the survey.

§ 35.406 Brachytherapy sources inventory.

(a) Promptly after removing them from a patient, a licensee shall return brachytherapy sources to the storage area, and count the number returned to ensure that all sources taken from the storage area have been returned.

(b) A licensee shall make a record of brachytherapy source use which must include:

(1) The names of the individuals permitted to handle the sources;

(2) The number and activity of sources removed from storage, the patient's name and room number, the time and date they were removed from storage, the number and activity of the sources in storage after the removal, and the initials of the individual who removed the sources from storage;

(3) The number and activity of sources returned to storage, the patient's name and room number, the time and date they were returned to storage, the number and activity of sources in storage after the return, and the initials of the individual who returned the sources to storage.

(c) Immediately after implanting sources in a patient the licensee shall make a radiation survey of the patient and the area of use to confirm that no sources have been misplaced. The licensee shall make a record of each survey.

(d) A licensee shall retain the records required in paragraphs (b) and (c) of this section for three years.

§ 35.410 Safety instruction.

(a) The licensee shall provide radiation safety instruction to all personnel caring for the patient undergoing implant therapy. To satisfy this requirement, the instruction must describe:

(1) Size and appearance of the brachytherapy sources;

(2) Safe handling and shielding instructions in case of a dislodged source;

(3) Procedures for patient control;

(4) Procedures for visitor control; and

(5) Procedures for notification of the Radiation Safety Officer if the patient dies or has a medical emergency.

(b) A licensee shall retain for three years a record of individuals receiving instruction required by paragraph (a) of this section, a description of the instruction, the date of instruction, and the name of the individual who gave the instruction.

§ 35.415 Safety precautions.

(a) For each patient receiving implant therapy, a licensee shall:

(1) Not quarter the patient in the same room with a patient who is not receiving radiation therapy unless the licensee can demonstrate compliance with the requirements of § 20.105(b) or, for licensees implementing the provisions of §§ 20.1001–20.2401, § 20.1301(a) of this chapter at a distance of one meter from the implant;

(2) Post the patient's door with a "Radioactive Materials" sign and note on the door or in the patient's chart where and how long visitors may stay in the patient's room;

(3) Authorize visits by individuals under age 18 only on a patient-by-patient basis with the approval of the authorized user after consultation with the Radiation Safety Officer; and

(4) Promptly after implanting the material, survey the dose rates in contiguous restricted and unrestricted areas with a radiation measurement survey instrument to demonstrate compliance with the requirements of Part 20 of this chapter, and retain for three years a record of each survey that includes the time and date of the survey, a plan of the area or list of points surveyed, the measured dose rate at several points expressed in millirem per hour, the instrument used to make the survey, and the initials of the individual who made the survey;

(5) Provide the patient with radiation safety guidance that will help to keep radiation dose to household members and the public as low as reasonably achievable before releasing the patient if the patient was administered a permanent implant.

(b) A licensee shall notify the Radiation Safety Officer immediately if the patient dies or has a medical emergency.

§ 35.420 Possession of survey instrument.

A licensee authorized to use byproduct material for implant therapy shall have in its possession a portable radiation detection survey instrument capable of detecting dose rates over the range 0.1 millirem per hour to 100 millirem per hour, and a portable radiation measurement survey instrument capable of measuring dose rates over the range 1 millirem per hour to 1000 millirem per hour.

Subpart H—Sealed Sources for Diagnosis

§ 35.500 Use of sealed sources for diagnosis.

A licensee shall use the following sealed sources in accordance with the manufacturer's radiation safety and handling instructions:

(a) Iodine-125, americium-241, or gadolinium-153 as a sealed source in a device for bone mineral analysis; and

(b) Iodine-125 as a sealed source in a portable imaging device.

§ 35.520 Availability of survey instrument.

A licensee authorized to use byproduct material as a sealed source for diagnostic purposes shall have available for use a portable radiation detection survey instrument capable of detecting dose rates over the range 0.1 millirem per hour to 100 millirem per hour or a portable radiation measurement survey instrument capable of measuring dose rates over the range 1 millirem per hour to 1000 millirem per hour. The instrument must have been calibrated in accordance with § 35.51 of this part.

Subpart I—Teletherapy

§ 35.600 Use of a sealed source in a teletherapy unit.

The regulations and provisions of this subpart govern the use of teletherapy units for medical use that contain a sealed source of cobalt-60 or cesium-137.

§ 35.605 Maintenance and repair restrictions.

Only a person specifically licensed by the Commission or an Agreement State to perform teletherapy unit maintenance and repair shall:

(a) Install, relocate, or remove a teletherapy sealed source or a teletherapy unit that contains a sealed source; or

(b) Maintain, adjust, or repair the source drawer, the shutter or other mechanism of a teletherapy unit that could expose the source, reduce the shielding around the source, or result in increased radiation levels.

§ 35.606 License amendments.

In addition to the changes specified in § 35.13 of this part, a licensee shall apply for and must receive a license amendment before:

(a) Making any change in the treatment room shielding;

(b) Making any change in the location of the teletherapy unit within the treatment room;

(c) Using the teletherapy unit in a manner that could result in increased radiation levels in areas outside the teletherapy treatment room;

(d) Relocating the teletherapy unit; or

(e) Allowing an individual not listed on the licensee's license to perform the duties of the teletherapy physicist.

§ 35.610 Safety instruction.

(a) A licensee shall post instructions at the teletherapy unit console. To satisfy this requirement, these instructions must inform the operator of:

(1) The procedure to be followed to ensure that only the patient is in the treatment room before turning the primary beam of radiation on to begin a treatment or after a door interlock interruption;

(2) The procedure to be followed if:

(i) The operator is unable to turn the primary beam of radiation off with controls outside the treatment room or any other abnormal operation occurs; and

(ii) The names and telephone numbers of the authorized users and Radiation Safety Officer to be immediately contacted if the teletherapy unit or console operates abnormally.

(b) A licensee shall provide instruction in the topics identified in paragraph (a) of this section to all individuals who operate a teletherapy unit.

(c) A licensee shall retain for three years a record of individuals receiving instruction required by paragraph (b) of this section, a description of the instruction, the date of instruction, and the name of the individual who gave the instruction.

§ 35.615 Safety precautions.

(a) A licensee shall control access to the teletherapy room by a door at each entrance.

(b) A licensee shall equip each entrance to the teletherapy room with an electrical interlock system that will:

(1) Prevent the operator from turning the primary beam of radiation on unless each treatment room entrance door is closed;

(2) Turn the primary beam of radiation off immediately when an entrance door is opened; and

(3) Prevent the primary beam of radiation from being turned on following an interlock interruption until all treatment room entrance doors are closed and the beam on-off control is reset at the console.

(c) A licensee shall equip each entrance to the teletherapy room with a beam condition indicator light.

(d) A licensee shall install in each teletherapy room a permanent radiation monitor capable of continuously monitoring beam status.

(1) A radiation monitor must provide visible notice of a teletherapy unit malfunction that results in an exposed or partially exposed source, and must be observable by an individual entering the teletherapy room.

(2) A radiation monitor must be equipped with a backup power supply separate from the power supply to the teletherapy unit. This backup power supply may be a battery system.

(3) A radiation monitor must be checked with a dedicated check source for proper operation each day before the teletherapy unit is used for treatment of patients.

(4) A licensee shall maintain a record of the check required by paragraph (d)(3) of this section for three years. The record must include the date of the check, notation that the monitor indicates when its detector is and is not exposed, and the initials of the individual who performed the check.

(5) If a radiation monitor is inoperable, the licensee shall require any individual entering the teletherapy room to use a survey instrument or audible alarm personal dosimeter to monitor for any malfunction of the source exposure mechanism that may result in an exposed or partially exposed source. The instrument or dosimeter must be checked with a dedicated check source for proper operation at the beginning of each day of use. The licensee shall keep a record as described in paragraph (d)(4) of this section.

(6) A licensee shall promptly repair or replace the radiation monitor if it is inoperable.

(e) A licensee shall construct or equip each teletherapy room to permit continuous observation of the patient from the teletherapy unit console during irradiation.

§ 35.620 Possession of survey instrument.

A licensee authorized to use byproduct material in a teletherapy unit shall have in its possession either a portable radiation detection survey instrument capable of detecting dose rate over the range 0.1 millirem per hour to 100 millirem per hour or a portable radiation measurement survey instrument capable of measuring dose rates over the range 1 millirem per hour to 1,000 millirem per hour.

§ 35.630 Dosimetry equipment.

(a) A licensee shall have a calibrated dosimetry system available for use. To satisfy this requirement, one of the following two conditions must be met.

(1) The system must have been calibrated by the National Institute of Standards and Technology or by a calibration laboratory accredited by the American Association of Physicists in Medicine (AAPM). The calibration must have been performed within the previous two years and after any servicing that may have affected system calibration; or

(2) The system must have been calibrated within the previous four years; eighteen to thirty months after that calibration, the system must have been intercompared at an intercomparison meeting with another dosimetry system that was calibrated within the past twenty-four months by the National Institute of Standards and Technology or by a calibration laboratory accredited by the AAPM. The intercomparison meeting must be sanctioned by a calibration laboratory or radiologic physics center accredited by the AAPM. The results of the intercomparison meeting must have indicated that the calibration factor of the licensee's system had not changed by more than 2 percent. The licensee may not use the intercomparison result to change the calibration factor. When intercomparing dosimetry systems to be used for calibrating cobalt-60 teletherapy units, the licensee shall use a teletherapy unit with a cobalt-60 source. When intercomparing dosimetry systems to be used for calibrating cesium-137 teletherapy units, the licensee shall use a teletherapy unit with a cesium-137 source.

(b) The licensee shall have available for use a dosimetry system for spot-check measurements. To satisfy this requirement, the system may be compared with a system that has been calibrated in accordance with paragraph (a) of this section. This comparison must have been performed within the previous year and after each servicing that may have affected system calibration. The spot-check system may be the same system used to meet the requirement in paragraph (a) of this section.

(c) The licensee shall retain a record of each calibration, intercomparison, and comparison for the duration of the license. For each calibration, intercomparison, or comparison, the record must include the date, the model numbers and serial numbers of the instruments that were calibrated, intercompared, or compared as required by paragraphs (a) and (b) of this section, the correction factor that was determined from the calibration or comparison or the apparent correction factor that was determined from an intercomparison, the names of the individuals who performed the calibration, intercomparison, or comparison, and evidence that the intercomparison meeting was sanctioned by a calibration laboratory or radiologic physics center accredited by AAPM.

§ 35.632 Full calibration measurements.

(a) A licensee authorized to use a teletherapy unit for medical use shall perform full calibration measurements on each teletherapy unit:

(1) Before the first medical use of the unit; and

(2) Before medical use under the following conditions:

(i) Whenever spot-check measurements indicate that the output differs by more than 5 percent from the output obtained at the last full calibration corrected mathematically for radioactive decay;

(ii) Following replacement of the source or following reinstallation of the teletherapy unit in a new location;

(iii) Following any repair of the teletherapy unit that includes removal of the source or major repair of the components associated with the source exposure assembly; and

(3) At intervals not exceeding one year.

(b) To satisfy the requirement of paragraph (a) of this section, full calibration measurements must include determination of:

(1) The output within ±3 percent for the range of field sizes and for the distance or range of distances used for medical use;

(2) The coincidence of the radiation field and the field indicated by the light beam localizing device;

(3) The uniformity of the radiation field and its dependence on the orientation of the useful beam;

(4) Timer constancy and linearity over the range of use;

(5) On-off error; and

(6) The accuracy of all distance measuring and localization devices in medical use.

(c) A licensee shall use the dosimetry system described in § 35.630(a) to measure the output for one set of exposure conditions. The remaining radiation measurements required in paragraph (b)(1) of this section may be made using a dosimetry system that indicates relative dose rates.

(d) A licensee shall make full calibration measurements required by paragraph (a) of this section in

accordance with either the procedures recommended by the Scientific Committee on Radiation Dosimetry of the American Association of Physicists in Medicine that are described in *Physics in Medicine and Biology* Vol. 16, No. 3, 1971, pp. 379–396, or by Task Group 21 of the Radiation Therapy Committee of the American Association of Physicists in Medicine that are described in *Medical Physics* Vol. 10, No. 6, 1983, pp. 741–771, and Vol. 11, No. 2, 1984, p. 213. (Both of these references have been approved for incorporation by reference by the Director of the Federal Register. Copies of the documents are available for inspection or may be obtained from the U.S. Nuclear Regulatory Commission, Public Document Room, 2120 L Street NW., Washington, DC 20555. Copies of the documents are also on file at the Office of the Federal Register, 1100 L Street NW., Room 8301, Washington, DC 20408. A notice of any change in the material will be published in the **Federal Register**.)

(e) A licensee shall correct mathematically the outputs determined in paragraph (b)(1) of this section for physical decay for intervals not exceeding one month for cobalt-60 or six months for cesium-137.

(f) Full calibration measurements required by paragraph (a) of this section and physical decay corrections required by paragraph (e) of this section must be performed by the licensee's teletherapy physicist.

(g) A licensee shall retain a record of each calibration for the duration of use of the teletherapy unit source. The record must include the date of the calibration, the manufacturer's name, model number, and serial number for both the teletherapy unit and the source, the model numbers and serial numbers of the instruments used to calibrate the teletherapy unit, tables that describe the output of the unit over the range of field sizes and for the range of distances used in radiation therapy, a determination of the coincidence of the radiation field and the field indicated by the light beam localizing device, an assessment of timer linearity and constancy, the calculated on-off error, the estimated accuracy of each distance measuring or localization device, and the signature of the teletherapy physicist.

§ 35.634 Periodic spot-checks.

(a) A licensee authorized to use teletherapy units for medical use shall perform output spot-checks on each teletherapy unit once in each calendar month that include determination of:

(1) Timer constancy, and timer linearity over the range of use;

(2) On-off error;

(3) The coincidence of the radiation field and the field indicated by the light beam localizing device;

(4) The accuracy of all distance measuring and localization devices used for medical use;

(5) The output for one typical set of operating conditions measured with the dosimetry system described in § 35.630(b) of this part; and

(6) The difference between the measurement made in paragraph (b)(5) of this section and the anticipated output, expressed as a percentage of the anticipated output (i.e., the value obtained at last full calibration corrected mathematically for physical decay).

(b) A licensee shall perform measurements required by paragraph (a) of this section in accordance with procedures established by the teletherapy physicist. That individual need not actually perform the spotcheck measurements.

(c) A licensee shall have the teletherapy physicist review the results of each spot-check within 15 days. The teletherapy physicist shall promptly notify the licensee in writing of the results of each spot-check. The licensee shall keep a copy of each written notification for three years.

(d) A licensee authorized to use a teletherapy unit for medical use shall perform safety spot-checks of each teletherapy facility once in each calendar month that assure proper operation of:

(1) Electrical interlocks at each teletherapy room entrance;

(2) Electrical or mechanical stops installed for the purpose of limiting use of the primary beam of radiation (restriction of source housing angulation or elevation, carriage or stand travel and operation of the beam on-off mechanism);

(3) Beam condition indicator lights on the teletherapy unit, on the control console, and in the facility;

(4) Viewing systems;

(5) Treatment room doors from inside and outside the treatment room; and

(6) Electrically assisted treatment room doors with the teletherapy unit electrical power turned off.

(e) A licensee shall arrange for prompt repair of any system identified in paragraph (d) of this section that is not operating properly, and shall not use the teletherapy unit following door interlock malfunction until the interlock system has been repaired.

(f) A licensee shall retain a record of each spot-check required by paragraphs (a) and (d) of this section for three years. The record must include the date of the spot-check, the manufacturer's name, model number, and serial number for both the teletherapy unit and source, the manufacturer's name, model number and serial number of the instrument used to measure the output of the teletherapy unit, an assessment of timer linearity and constancy, the calculated on-off error, a determination of the coincidence of the radiation field and the field indicated by the light beam localizing device, the calculated on-off error, the determined accuracy of each distance measuring or localization device, the difference between the anticipated output and the measured output, notations indicating the operability of each entrance door electrical interlock, each electrical or mechanical stop, each beam condition indicator light, the viewing system and doors, and the signature of the individual who performed the periodic spot-check.

§ 35.636 Safety checks for teletherapy facilities.

(a) A licensee shall promptly check all systems listed in § 35.634(d) for proper function after each installation of a teletherapy source and after making any change for which an amendment is required by § 35.606 (a)–(d).

(b) If the results of the checks required in paragraph (a) of this section indicate the malfunction of any system specified in § 35.634(d), the licensee shall lock the control console in the off position and not use the unit except as may be necessary to repair, replace, or check the malfunctioning system.

(c) A licensee shall retain for three years a record of the facility checks following installation of a source. The record must include notations indicating the operability of each entrance door interlock, each electrical or mechanical stop, each beam condition indicator light, the viewing system, and doors, and the signature of the Radiation Safety Officer.

§ 35.641 Radiation surveys for teletherapy facilities.

(a) Before medical use, after each installation of a teletherapy source, and after making any change for which an amendment is required by § 35.606 (a)–(d), the licensee shall perform radiation surveys with a portable radiation measurement survey instrument calibrated in accordance with § 35.51 of this part to verify that:

(1) The maximum and average dose rates at one meter from the teletherapy source with the source in the off position and the collimators set for a normal treatment field do not exceed 10

millirem per hour and 2 millirem per hour, respectively; and

(*) With the teletherapy source in the on position with the largest clinically available treatment field and with a scattering phantom in the primary beam of radiation, that:

(i) Radiation dose quantities per unit time in restricted areas are not likely to cause personnel exposures in excess of the limits specified in § 20.101 or, for licensees implementing the provisions of §§ 20.1001–20.2401, § 20.1201 of this chapter; and

(ii) Radiation dose quantities per unit time in unrestricted areas do not exceed the limits specified in § 20.105(b) or, for licensees implementing the provisions of §§ 20.1001–20.2401, § 20.1301 of this chapter.

(b) If the results of the surveys required in paragraph (a) of this section indicate any radiation dose quantity per unit time in excess of the respective limit specified in that paragraph, the licensee shall lock the control in the off position and not use the unit

(1) Except as may be necessary to repair, replace, or test the teletherapy unit shielding or the treatment room shielding; or

(2) Until the licensee has received a specific exemption pursuant to § 20.501 or, for licensees implementing the provisions of §§ 20.1001–20.2401, § 20.1301 of this chapter.

(c) A licensee shall retain a record of the radiation measurements made following installation of a source for the duration of the license. The record must include the date of the measurements, the reason the survey is required, the manufacturer's name, model number and serial number of the teletherapy unit, the source, and the instrument used to measure radiation levels, each dose rate measured around the teletherapy source while in the off position and the average of all measurements, a plan of the areas surrounding the treatment room that were surveyed, the measured dose rate at several points in each area expressed in millirem per hour, the calculated maximum quantity of radiation over a period of one week for each restricted and unrestricted area, and the signature of the Radiation Safety Officer.

§ 35.643 Modification of teletherapy unit or room before beginning a treatment program.

(a) If the survey required by § 35.641 indicates that an individual in an unrestricted area may be exposed to levels of radiation greater than those permitted by § 20.105(b) or, for licensees implementing the provisions of §§ 20.1001–20.2401, § 20.1301 of this chapter, before beginning the treatment program the licensee shall:

(1) Either equip the unit with stops or add additional radiation shielding to ensure compliance with § 20.105(b) of this chapter or, for licensees implementing the provisions of §§ 20.1001–20.2401, § 20.1301(c) of this chapter.

(2) Perform the survey required by § 35.641 again; and

(3) Include in the report required by § 35.645 the results of the initial survey, a description of the modification made to comply with paragraph (a)(1) of this section, and the results of the second survey.

(b) As an alternative to the requirements set out in paragraph (a) of this section, a licensee may request a license amendment under § 20.105(a) or, for licensees implementing the provisions of §§ 20.1001–20.2401, § 20.1301(c) of this chapter that authorizes radiation levels in unrestricted areas greater than those permitted by § 20.105(b) of this chapter or, for licensees implementing the provisions of §§ 20.1001–20.2401, § 20.1301(a) of this chapter. A licensee may not begin the treatment program until the license amendment has been issued.

§ 35.645 Reports of teletherapy surveys, checks, tests, and measurements.

A licensee shall mail a copy of the records required in §§ 35.636, 35.641, 35.643, and the output from the teletherapy source expressed as roentgens or rads per hour at one meter from the source and determined during the full calibration required in § 35.632, to the appropriate Commission Regional Office listed in § 30.6 of this chapter within thirty days following completion of the action that initiated the record requirement.

§ 35.647 Five-year inspection.

(a) A licensee shall have each teletherapy unit fully inspected and serviced during teletherapy source replacement or at intervals not to exceed five years, whichever comes first, to assure proper functioning of the source exposure mechanism.

(b) This inspection and servicing may only be performed by persons specifically licensed to do so by the Commission or an Agreement State.

(c) A licensee shall keep a record of the inspection and servicing for the duration of the license. The record must contain the inspector's name, the inspector's license number, the date of inspection, the manufacturer's name and model number and serial number for both the teletherapy unit and source, a list of components inspected, a list of components serviced and the type of service, a list of components replaced, and the signature of the inspector.

Subpart J—Training and Experience Requirements

§ 35.900 Radiation Safety Officer.

Except as provided in § 35.901, the licensee shall require an individual fulfilling the responsibilities of the Radiation Safety Officer as provided in § 35.32 to be an individual who:

(a) Is certified by:

(1) American Board of Health Physics in Comprehensive Health Physics;

(2) American Board of Radiology;

(3) American Board of Nuclear Medicine;

(4) American Board of Science in Nuclear Medicine; or

(5) Board of Pharmaceutical Specialties in Nuclear Pharmacy; or

(b) Has had classroom and laboratory training and experience as follows:

(1) 200 hours of classroom and laboratory training that includes:

(i) Radiation physics and instrumentation;

(ii) Radiation protection;

(iii) Mathematics pertaining to the use and measurement of radioactivity;

(iv) Radiation biology; and

(v) Radiopharmaceutical chemistry; and

(2) One year of full time experience as a radiation safety technologist at a medical institution under the supervision of the individual identified as the Radiation Safety Officer on a Commission or Agreement State license that authorizes the medical use of byproduct material; or

(c) Be an authorized user identified on the licensee's license.

§ 35.901 Training for experienced Radiation Safety Officer.

An individual identified as a Radiation Safety Officer on a Commission or Agreement State license before October 1, 1986 need not comply with the training requirements of § 35.900.

§ 35.910 Training for uptake, dilution, and excretion studies.

Except as provided in §§ 35.970 and 35.971, the licensee shall require the authorized user of a radiopharmaceutical in § 35.100(a) to be a physician who:

(a) Is certified in:

(1) Nuclear medicine by the American Board of Nuclear Medicine;

(2) Diagnostic radiology by the American Board of Radiology; or

(3) Diagnostic radiology or radiology by the American Osteopathic Board of Radiology; or

(b) Has had classroom and laboratory training in basic radioisotope handling techniques applicable to the use of prepared radiopharmaceuticals, and supervised clinical experience as follows:

(1) 40 hours of classroom and laboratory training that includes:

(i) Radiation physics and instrumentation;

(ii) Radiation protection;

(iii) Mathematics pertaining to the use and measurement of radioactivity;

(iv) Radiation biology; and

(v) Radiopharmaceutical chemistry; and

(2) 20 hours of supervised clinical experience under the supervision of an authorized user and that includes:

(i) Examining patients and reviewing their case histories to determine their suitability for radioisotope diagnosis, limitations, or contraindications;

(ii) Selecting the suitable radiopharmaceuticals and calculating and measuring the dosages;

(iii) Administering dosages to patients and using syringe radiation shields;

(iv) Collaborating with the authorized user in the interpretation of radioisotope test results; and

(v) Patient followup; or

(c) Has successfully completed a six-month training program in nuclear medicine as part of a training program that has been approved by the Accreditation Council for Graduate Medical Education and that included classroom and laboratory training, work experience, and supervised clinical experience in all the topics identified in paragraph (b) of this section.

§ 35.920 Training for imaging and localization studies.

Except as provided in § 35.970 or 35.971, the licensee shall require the authorized user of a radiopharmaceutical, generator, or reagent kit in § 35.200(a) to be a physician who:

(a) Is certified in:

(1) Nuclear medicine by the American Board of Nuclear Medicine;

(2) Diagnostic radiology by the American Board of Radiology; or

(3) Diagnostic radiology or radiology by the American Osteopathic Board of Radiology; or

(b) Has had classroom and laboratory training in basic radioisotope handling techniques applicable to the use of prepared radiopharmaceuticals, generators, and reagent kits, supervised work experience, and supervised clinical experience as follows:

(1) 200 hours of classroom and laboratory training that includes:

(i) Radiation physics and instrumentation;

(ii) Radiation protection;

(iii) Mathematics pertaining to the use and measurement of radioactivity;

(iv) Radiopharmaceutical chemistry; and

(v) Radiation biology; and

(2) 500 hours of supervised work experience under the supervision of an authorized user that includes:

(i) Ordering, receiving, and unpacking radioactive materials safely and performing the related radiation surveys;

(ii) Calibrating dose calibrators and diagnostic instruments and performing checks for proper operation of survey meters;

(iii) Calculating and safely preparing patient dosages;

(iv) Using administrative controls to prevent the misadministration of byproduct material;

(v) Using procedures to contain spilled byproduct material safely and using proper decontamination procedures; and

(vi) Eluting technetium-99m from generator systems, measuring and testing the eluate for molybdenum-99 and alumina contamination, and processing the eluate with reagent kits to prepare technetium-99m labeled radiopharmaceuticals; and

(3) 500 hours of supervised clinical experience under the supervision of an authorized user that includes:

(i) Examining patients and reviewing their case histories to determine their suitability for radioisotope diagnosis, limitations, or contraindications;

(ii) Selecting the suitable radiopharmaceuticals and calculating and measuring the dosages;

(iii) Administering dosages to patients and using syringe radiation shields;

(iv) Collaborating with the authorized user in the interpretation of radioisotope test results; and

(v) Patient followup; or

(c) Has successfully completed a six-month training program in nuclear medicine that has been approved by the Accreditation Council for Graduate Medical Education and that included classroom and laboratory training, work experience, and supervised clinical experience in all the topics identified in paragraph (b) of this section.

§ 35.930 Training for therapeutic use of radiopharmaceuticals.

Except as provided in § 35.970, the licensee shall require the authorized user of radiopharmaceuticals in § 35.300 to be a physician who:

(a) Is certified by:

(1) The American Board of Nuclear Medicine; or

(2) The American Board of Radiology in radiology or therapeutic radiology; or

(b) Has had classroom and laboratory training in basic radioisotope handling techniques applicable to the use of therapeutic radiopharmaceuticals, and supervised clinical experience as follows:

(1) 80 hours of classroom and laboratory training that includes:

(i) Radiation physics and instrumentation;

(ii) Radiation protection;

(iii) Mathematics pertaining to the use and measurement of radioactivity; and

(iv) Radiation biology; and

(2) Supervised clinical experience under the supervision of an authorized user at a medical institution that includes:

(i) Use of iodine-131 for diagnosis of thyroid function and the treatment of hyperthyroidism or cardiac dysfunction in 10 individuals; and

(ii) Use of iodine-131 for treatment of thyroid carcinoma in 3 individuals.

§ 35.932 Training for treatment of hyperthyroidism.

Except as provided in § 35.970, the licensee shall require the authorized user of only iodine-131 for the treatment of hyperthyroidism to be a physician with special experience in thyroid disease who has had classroom and laboratory training in basic radioisotope handling techniques applicable to the use of iodine-131 for treating hyperthyroidism, and supervised clinical experience as follows:

(a) 80 hours of classroom and laboratory training that includes:

(1) Radiation physics and instrumentation;

(2) Radiation protection;

(3) Mathematics pertaining to the use and measurement of radioactivity; and

(4) Radiation biology; and

(b) Supervised clinical experience under the supervision of an authorized user that includes the use of iodine-131 for diagnosis of thyroid function, and the treatment of hyperthyroidism in 10 individuals.

§ 35.934 Training for treatment of thyroid carcinoma.

Except as provided in § 35.970, the licensee shall require the authorized user of only iodine-131 for the treatment of thyroid carcinoma to be a physician with special experience in thyroid disease who has had classroom and laboratory training in basic radioisotope handling techniques applicable to the use of iodine-131 for treating thyroid carcinoma, and supervised clinical experience as follows:

(a) 80 hours of classroom and laboratory training that includes:

(1) Radiation physics and instrumentation;

(2) Radiation protection;

(3) Mathematics pertaining to the use and measurement of radioactivity; and

(4) Radiation biology; and

(b) Supervised clinical experience under the supervision of an authorized user that includes the use of iodine-131 for the treatment of thyroid carcinoma in 3 individuals.

§ 35.940 Training for use of brachytherapy sources.

Except as provided in § 35.970, the licensee shall require the authorized

user of a brachytherapy source listed in § 35.400 for therapy to be a physician who:

(a) Is certified in:

(1) Radiology or therapeutic radiology by the American Board of Radiology;

(2) Radiation oncology by the American Osteopathic Board of Radiology;

(3) Radiology, with specialization in radiotherapy, as a British "Fellow of the Faculty of Radiology" or "Fellow of the Royal College of Radiology"; or

(4) Therapeutic radiology by the Canadian Royal College of Physicians and Surgeons; or

(b) Is in the active practice of therapeutic radiology, has had classroom and laboratory training in radioisotope handling techniques applicable to the therapeutic use of brachytherapy sources, supervised work experience, and supervised clinical experience as follows:

(1) 200 hours of classroom and laboratory training that includes:

(i) Radiation physics and instrumentation;

(ii) Radiation protection;

(iii) Mathematics pertaining to the use and measurement of radioactivity; and

(iv) Radiation biology;

(2) 500 hours of supervised work experience under the supervision of an authorized user at a medical institution that includes:

(i) Ordering, receiving, and unpacking radioactive materials safely and performing the related radiation surveys;

(ii) Checking survey meters for proper operation;

(iii) Preparing, implanting, and removing sealed sources;

(iv) Maintaining running inventories of material on hand;

(v) Using administrative controls to prevent the misadministration of byproduct material; and

(vi) Using emergency procedures to control byproduct material; and

(3) Three years of supervised clinical experience that includes one year in a formal training program approved by the Residency Review Committee for Radiology of the Accreditation Council for Graduate Medical Education or the Committee on Postdoctoral Training of the American Osteopathic Association, and an additional two years of clinical experience in therapeutic radiology under the supervision of an authorized user at a medical institution that includes:

(i) Examining individuals and reviewing their case histories to determine their suitability for brachytherapy treatment, and any limitations or contraindications;

(ii) Selecting the proper brachytherapy sources and dose and method of administration;

(iii) Calculating the dose; and

(iv) Post-administration followup and review of case histories in collaboration with the authorized user.

§ 35.941 Training for ophthalmic use of strontium-90.

Except as provided in § 35.970, the licensee shall require the authorized user of only strontium-90 for ophthalmic radiotherapy to be a physician who is in the active practice of therapeutic radiology or ophthalmology, and has had classroom and laboratory training in basic radioisotope handling techniques applicable to the use of strontium-90 for ophthalmic radiotherapy, and a period of supervised clinical training in ophthalmic radiotherapy as follows:

(a) 24 hours of classroom and laboratory training that includes:

(1) Radiation physics and instrumentation;

(2) Radiation protection;

(3) Mathematics pertaining to the use and measurement of radioactivity; and

(4) Radiation biology;

(b) Supervised clinical training in ophthalmic radiotherapy under the supervision of an authorized user at a medical institution that includes the use of strontium-90 for the ophthalmic treatment of five individuals that includes:

(1) Examination of each individual to be treated;

(2) Calculation of the dose to be administered;

(3) Administration of the dose; and

(4) Followup and review of each individual's case history.

§ 35.950 Training for use of sealed sources for diagnosis.

Except as provided in § 35.970, the licensee shall require the authorized user of a sealed source in a device listed in § 35.500 to be a physician, dentist, or podiatrist who:

(a) Is certified in:

(1) Radiology, diagnostic radiology, or therapeutic radiology by the American Board of Radiology;

(2) Nuclear medicine by the American Board of Nuclear Medicine; or

(3) Diagnostic radiology or radiology by the American Osteopathic Board of Radiology; or

(b) Has had 8 hours of classroom and laboratory training in basic radioisotope handling techniques specifically applicable to the use of the device that includes:

(1) Radiation physics, mathematics pertaining to the use and measurement of radioactivity, and instrumentation;

(2) Radiation biology;

(3) Radiation protection; and

(4) Training in the use of the device for the uses requested.

§ 35.960 Training for teletherapy.

Except as provided in § 35.970, the licensee shall require the authorized user of a sealed source listed in § 35.600 in a teletherapy unit to be a physician who:

(a) Is certified in:

(1) Radiology or therapeutic radiology by the American Board of Radiology;

(2) Radiation oncology by the American Osteopathic Board of Radiology;

(3) Radiology, with specialization in radiotherapy, as a British "Fellow of the Faculty of Radiology" or "Fellow of the Royal College of Radiology"; or

(4) Therapeutic radiology by the Canadian Royal College of Physicians and Surgeons; or

(b) Is in the active practice of therapeutic radiology, and has had classroom and laboratory training in basic radioisotope techniques applicable to the use of a sealed source in a teletherapy unit, supervised work experience, and supervised clinical experience as follows:

(1) 200 hours of classroom and laboratory training that includes:

(i) Radiation physics and instrumentation;

(ii) Radiation protection;

(iii) Mathematics pertaining to the use and measurement of radioactivity; and

(iv) Radiation biology;

(2) 500 hours of supervised work experience under the supervision of an authorized user at a medical institution that includes:

(i) Review of the full calibration measurements and periodic spot checks;

(ii) Preparing treatment plans and calculating treatment times;

(iii) Using administrative controls to prevent misadministrations;

(iv) Implementing emergency procedures to be followed in the event of the abnormal operation of a teletherapy unit or console; and

(v) Checking and using survey meters; and

(3) Three years of supervised clinical experience that includes one year in a formal training program approved by the Residency Review Committee for Radiology of the Accreditation Council for Graduate Medical Education or the Committee on Postdoctoral Training of the American Osteopathic Association and an additional two years of clinical experience in therapeutic radiology

under the supervision of an authorized user at a medical institution that includes:

(i) Examining individuals and reviewing their case histories to determine their suitability for teletherapy treatment, and any limitations or contraindications;

(ii) Selecting the proper dose and how it is to be administered;

(iii) Calculating the teletherapy doses and collaborating with the authorized user in the review of patients' progress and consideration of the need to modify originally prescribed doses as warranted by patients' reaction to radiation; and

(iv) Post-administration followup and review of case histories.

§ 35.961 Training for teletherapy physicist.

The licensee shall require the teletherapy physicist to be an individual who:

(a) Is certified by the American Board of Radiology in:

(1) Therapeutic radiological physics;

(2) Roentgen ray and gamma ray physics;

(3) X-ray and radium physics; or

(4) Radiological physics; or

(b) Holds a master's or doctor's degree in physics, biophysics, radiological physics, or health physics, and has completed one year of full time training in therapeutic radiological physics and an additional year of full time work experience under the supervision of a teletherapy physicist at a medical institution that includes the tasks listed in §§ 35.59, 35.632, 35.634, and 35.641 of this part.

§ 35.970 Training for experienced authorized users.

Physicians, dentists, or podiatrists identified as authorized users for the medical, dental, or podiatric use of byproduct material on a Commission or Agreement State license issued before April 1, 1987 who perform only those methods of use for which they were authorized on that date need not comply with the training requirements of Subpart J.

§ 35.971 Physician training in a three month program.

A physician who, before July 1, 1984, began a three month nuclear medicine training program approved by the Accreditation Council for Graduate Medical Education and has successfully completed the program need not comply with the requirements of §§ 35.910 or 35.920.

§ 35.972 Recentness of training.

The training and experience specified in this subpart must have been obtained within the five years preceding the date of application or the individual must have had related continuing education and experience since the required training and experience was completed.

Subpart K—Enforcement

§ 35.990 Violations.

(a) An injunction or other court order may be obtained to prohibit a violation of any provision of:

(1) The Atomic Energy Act of 1954, as amended;

(2) Title II of the Energy Reorganization Act of 1974, as amended; or

(3) Any rule, regulation, or order issued under these Acts.

(b) A court order may be obtained for the payment of a civil penalty imposed for violation of:

(1) Sections 53, 57, 62, 63, 81, 82, 101, 103, 104, 107, or 109 under section 234 of the Atomic Energy Act of 1954, as amended;

(2) Section 206 of the Energy Reorganization Act of 1974;

(3) Any rule, regulation, or order issued under these Acts;

(4) Any term, condition, or limitation of any license issued under these Acts; or

(5) Any requirement for which a license may be revoked under section 186 of the Atomic Energy Act of 1954, as amended.

(c) Any person who willfully violates any provision of the Atomic Energy Act of 1954, as amended, or any rule, regulation, or order issued under the Act may be guilty of a crime and, upon conviction, may be punished by fine or imprisonment or both as provided by law. Regulations issued under the Act include regulations issued under sec. 161, and cited in the authority citation at the beginning of this part for the purposes of sec. 223.

§ 35.999 Resolution of conflicting requirements during transition period.

If the rules in this part conflict with the licensee's radiation safety program as identified in its license, and if that license was approved by the Commission before April 1, 1987 and has not been renewed since April 1, 1987, then the requirements in the license will apply. However, if that licensee exercises its privilege to make minor changes in its radiation safety procedures that are not potentially important to safety under § 35.31 of this chapter, the portion changed must comply with the requirements of this Part. At the time of license renewal and thereafter, these admendments to this Part shall apply.