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INDIANAPOLIS, INDIANA 46260

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THOMAS J. LINNEMEIER, M.D., F.A.C.C.

DIPLOMATES, AMERICAN BOARDS OF INTERNAL MEDICINE AND CARDIOVASCULAR DISEASES

July 25, 1985

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U.S.N.R.C.
LIC. FEE MGMT. BRANCH

Materials Licensing Section
U.S. Nuclear Regulatory Commission, Region III
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Gentlemen:

Please amend our byproduct materials license number 13-24359-01 as follows:

1. Incorporate new facility diagram (enclosed). This represents an expansion of our previously approved room.

2. Incorporate the following equipment:

   a) Siemens ZLC LEM mobile gamma camera with an ADAC DPS-2800 computer system.

   b) Baird System 77 Digital Gamma Camera.

   c) Ludlum Model 14C GM survey meter with a thin end-window probe.
   Low range 0- 0.2 mR/h
   High range 0- 2000 mR/h

   d) Capintec CRC-12 Ionization chamber dose calibration.

3. Change the routine survey meter calibration frequency to annually rather than quarterly. Survey meter calibration will be performed at the Indianapolis Syncor, Inc. facility using procedures approved by the NRC under byproduct materials license number 13-19229-01 MD, or by returning the meter to the manufacturer.

4. Incorporate the enclosed Dose Calibrator Quality Control Procedures in place of those submitted with the original application (item 10).

Applicant Aug 16 11
Check No. 8495 61.00
Amount Fee Category 7C
Type of Fee Amd
Date Check Rec'd 8/14/85
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13-24359-01 PDR

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AUG 9 1985
CONTROL NO. 7 9532 REGION III

RE: Materials Licensing Section

5. The required semi-annual leak tests of our sealed sources will be performed by our consulting physicist.

Enclosed is a check for $120.00 as required for an amendment. If you have any questions regarding the requested modifications, please let me know.

Sincerely,

Ronald J. Landin, M.D.
Radiation Safety Officer

RL/kaa
7/25/85

CALIBRATION OF DOSE CALIBRATOR

A. CONSTANCY

Sources:

Cesium-137	100 - 200 microcuries
Cobalt-57	1 - 5 millicuries

Methodology:

Before each days use of the dose calibrator:

1. Assay the Cobalt-57 source on the Cobalt-57 setting. Record result.

2. Assay the Cesium-137 source on the Cesium-137 setting . Record result.

3. Compare the measured activities for each reference with the predicted activities from the computer printouts.

4. If the measured activity varies from the predicted activity by more than 5%, check the zero adjustment and background and repeat the assay. If the variation remains more than 5%, the dose calibrator needs repair or adjustment.

5. Assay the Cesium-137 source on each of the radionuclide settings to be used (or possibly used) that day. Record the measured activities and compare with the last recorded activity at each setting. If variation is more than 5%, follow step #4 above. (Note: At time of initial calibration, the source will be assayed on all potentially used settings and the results recorded)

B. LINEARITY

Source:

1. 50 millicurie vial of Tc-99m (as long as unit doses are obtained from Pharmatopes, Inc.)

2. first elution from a new generator (if generator is being used)

Methodology:

At installation and quarterly thereafter:

1. Assay the Tc-99m vial in the dose calibrator, subtract background, and record the net activity in millicuries.

2. Repeat step 1 at time intervals of 3, 6, 24,30 and 48 hours after the initial assay .

3. Using the 30 hour activity measurement as a starting point, calculate the predicted activities at 0, 3, 6, 24, and 48 hours using the following table:

Assay time (hours)	Correction factor
0	31.633
3	22.379
6	15.853
24	1.995
30	1
48	0.126

4. On semi-log graph paper, plot the measured activities and the actual activities (measured activity at 30 hours times the appropriate correction factor) versus time.

5. The activities plotted should be within 5% of the actual activities if the instrument is linear and functioning properly. Errors greater than 5% indicate the need for repair or adjustment of the instrument.

6. If instrument linearity cannot be corrected, it will be necessary in routine assays to use either an aliquot of the eluate that can be accurately measured (if generator is being used) or the graph constructed in step #4 to relate measured activities to calculated activities.

C. GEOMETRICAL VARIATION

At installation:

1. Assay a 30 cc vial containing approximately 2 millicuries of Tc-99m or other appropriate radionuclide in a volume of 1 cc

2. Increase the volume of liquid in the vial in steps to 2, 4, 8, 10, 2, and 25 cc by adding the appropriate amount of water or saline. After each addition, gently shake the vial to mix the contents and then assay as in step 1

3. Select one volume as a standard (e.g., 20 cc) and calculate the ratio of measured activities for each volume to the reference volume activity. This represents the volume correction factor

4. If the volume correction factors are greater than 2%, plot the correction factors against the volume on linear graph paper. Use the graph to select the proper volume correction factors for routine assay of that radionuclide

5. Compare the activity of Tc-99m in a syringe with the same activity and volume in a 30 cc vial OR assay the stock vial before and after filling the syringe. The activity in the syringe is the difference in the two readings (with a volume correction if significant)

D. ACCURACY

Sources: Reference standards whose activities have been calibrated by comparison with standard sources that have been assayed by NBS and documented. Activity levels should approximate those levels normally encountered in clinical use

Cesium-137
Cobalt-57
Barium-133
Others as available

At least annually:

1. Assay the reference standard in the dose calibrator on the appropriate setting

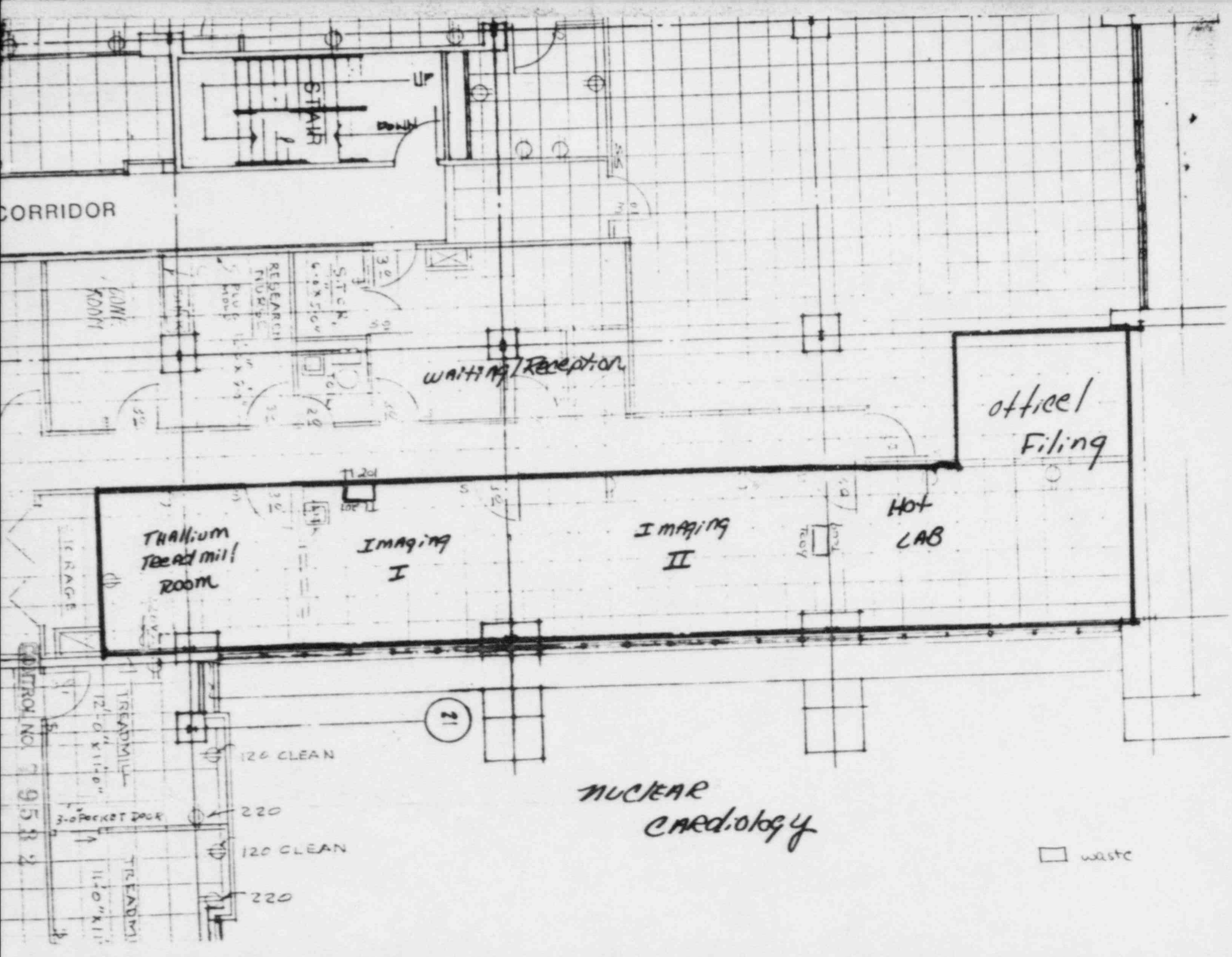
2. Repeat step 1 for a total of 3 determinations and average the results

3. The average activity determined in step 2 should agree with the certified activity of the reference source within 5% after decay corrections

4. Repeat the above steps for other radionuclides for which adequate reference standards are available

5. Keep a log of these measurements

6. Measurements that do not agree within 5% indicate that the instrument should be repaired or adjusted. If this is not possible, a calibration factor should be calculated for use during routine assays of radionuclides


STAIR
UP
DOWN
CORRIDOR
CONF. ROOM
RESEARCH NURSE
PLOT
SITTER
WAITING / Reception
office / Filing
THALLium TREADmill ROOM
IMAGing I
IMAGing II
Hot LAB
TROY
TREADMILL
12'-0" x 11'-0"
3-0 POCKET DOOR
11'-0" x 11'-0"
120 CLEAN
220
120 CLEAN
220
NUCLEAR cardiology
waste