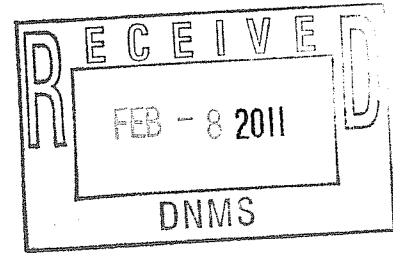




THE QUEEN'S MEDICAL CENTER

1301 Punchbowl Street • Honolulu, Hawaii 96813 • Phone (808) 538-9011 • FAX: (808) 547-4646 • www.queens.org
January 19, 2011

Lizette Roldan-Otero, Ph.D.
USNRC Region IV
612 E. Lamar Blvd., Suite 400
Arlington, TX 76011-4125



Docket No. 030-38244
Control No. ~~573492~~ *JLO*

License No. 53-29377-03

RE: Amendment for Reduction of Possession Limits

Dear Dr. Roldan-Otero,

Pertaining to the subject of activation of specific elements incidental to the production of F-18 in the Cyclotron facility, our research into this matter determined that the levels of incidental activation are much lower than initially estimated. Therefore, we request to revise the possession limits defined in NRC license 53-29377-03 as follows:

1) Amend Item 6C. to read as follows:

Byproduct Material	Form	Maximum Amount
Any byproduct material with atomic numbers 1 through 83, other than alpha emitting radionuclides	Incidentally Activated products	100 microcuries total

2) Amend Item 6G. to read as follows:

Byproduct Material	Form	Maximum Amount
Manganese-54	Incidentally Activated products	15,000 microcuries

3) Amend Item 6I. to read as follows:

Byproduct Material	Form	Maximum Amount
Cobalt-57	Incidentally Activated products	50 microcuries

4) Add specified byproduct material in following table:

Activated Elements with half-life greater than 120 days

Byproduct Material	Form	Maximum microcuries
Ar-39	Incidentally Activated Products	150
C-14	Incidentally Activated Products	50
Ca-41	Incidentally Activated Products	50
Ca-45	Incidentally Activated Products	3,000
Cd-109	Incidentally Activated Products	1,500
Cl-36	Incidentally Activated Products	50
Co-60	Incidentally Activated Products	400
Eu-152	Incidentally Activated Products	600
Eu-154	Incidentally Activated Products	100
Fe-55	Incidentally Activated Products	25,000
Fe-59	Incidentally Activated Products	100
H-3	Incidentally Activated Products	50
K-40	Incidentally Activated Products	100
Ni-63	Incidentally Activated Products	1,000
Pb-205	Incidentally Activated Products	100
S-35	Incidentally Activated Products	50
Sc-46	Incidentally Activated Products	50
W-181	Incidentally Activated Products	1,500
Zn-65	Incidentally Activated Products	1,500
Others	Incidentally Activated Products	100

Our Radiation Safety Officer, Brian Oyadomari, can be reached at (808) 547-4884 or email at boyado@queens.org for further information.. Thank you.

Sincerely,



Darlena Chadwick
Vice President, Professional Services

Extractor Body: Activated isotopes with half-life greater than 120 days

Reaction	Activated element	Half-life	Specific activity (Bq kg-1)	Weight (kg)	uCi	Appendix B uCi	Ratio (App. B x 10E4)
(p,n)	Zn-65	244.06 (d)	155000	300	1500	10	0.0150
(p,n)	Cd-109	461 (d)	155000	300	1500	10	0.0150
(p,n)	W-181	121.2 (d)	155000	300	1500	10	0.0150
(p,n)	Mn-54	312.3 (d)	319	300	5000	10	0.0500

Ratio < 1 as specified in 10 CFR 30.35(d) for unsealed form 0.0950

Cyclotron Shields: Activated isotopes with half-life greater than 120 days

Reaction	Activated element	Half-life	Specific activity (Bq kg-1)	Weight (kg)	uCi	Appendix B uCi	Ratio (App.B x 10E4)
(n,alpha)	C-14	5300 (y)	16.3	20000	50	100	0.0001
(n,gamma)	Ca-41	103000 (y)	23.4	20000	50	0.1	0.0500
(n,p)	K-40	1E+09 (y)	25	20000	50	0.1	0.0500
(n,alpha)	Ar-39	269 (y)	28	20000	50	0.1	0.0500
(n,gamma)	Ca-45	163 (d)	5450	20000	3000	10	0.0300
(n,gamma)	Fe-55	2.7 (y)	16600	20000	9000	100	0.0090
(n,gamma)	Fe-59	44.6 (d)	76.2	20000	50	10	0.0005
(n,gamma)	Eu-152	13.6 (y)	895	20000	500	1	0.0500
(n,gamma)	Eu-154	8.8 (y)	75.6	20000	50	1	0.0050
(n,gamma)	Co-60	5.3 (y)	328	20000	200	1	0.0200
(n,gamma)	K-40	1E+09 (y)	25	20000	50	0.1	0.0500
(n,p)	Ar-39	269 (y)	28	20000	50	0.1	0.0500
(n,alpha)	Cl-36	301000 (y)	25	20000	50	10	0.0005
(n,gamma)	H-3	12.3 (y)	25	20000	50	1000	0.0000
	Mn-54	312.3 (d)	1400	20000	5000	10	0.0500
	Other		0.828	20000	50	0.1	0.0500

Ratio < 1 as specified in 10 CFR 30.35(d) for unsealed form 0.4651

Concrete Floor: Activated isotopes with half-life greater than 120 days

Reaction	Activated element	Half-life	Specific activity (Bq kg-1)	Weight (kg)	uCi	Appendix B uCi	Ratio (App.B x 10E4)
(n,alpha)	Ar-39	269 (y)	29.6	50000	50	0.1	0.0500
(n,gamma)	Ca-45	163 (d)	213	50000	300	10	0.0030
(n,gamma)	Fe-55	2.7 (y)	654	50000	900	100	0.0009
(n,gamma)	Fe-59	44.6 (d)	22	50000	50	10	0.0005
(n,gamma)	Eu-152	13.6 (y)	47.5	50000	100	1	0.0100
(n,gamma)	Eu-154	8.8 (y)	21.4	50000	50	1	0.0050
(n,gamma)	Co-60	5.3 (y)	19	50000	50	1	0.0050
(n,gamma)	S-35	87.5 (d)	11.3	50000	50	100	0.0001
	Sc-46		29	50000	50	10	0.0005
	Mn-54	312.3 (d)	35	50000	5000	10	0.0500
	Others		0.883	50000	50	0.1	0.0500

Ratio < 1 as specified in 10 CFR 30.35(d) for unsealed form 0.1750

Cyclotron Shields: Activated isotopes with half-life greater than 120 days

Reaction	Activated element	Half-life	Specific activity (Bq kg-1)	Weight (kg)	uCi	Appendix B uCi	Ratio (App.B x 10E4)
(n,gamma)	Pb-205	2E+07 (y)	0.013	20000	50	0.1	0.0500
(n,2n)	Pb-205	2E+07 (y)	0.013	20000	50	0.1	0.0500

Ratio < 1 as specified in 10 CFR 30.35(d) for unsealed form 0.1000

Magnet: Activated isotopes with half-life greater than 120 days

Reaction	Activated element	Half-life	Specific activity (Bq kg-1)	Weight (kg)	uCi	Appendix B	Ratio (App.B x 10E4)
(n,alpha)	Fe-55	2.7 (y)	11400	21020	7000	100	0.0070
(n,p)	Co-60	5.27 (y)	62.2	21020	50	1	0.0050

(n,gamma)	Ni-63	100.1 (y)	1290	21020	1000	10	0.0100
(n,gamma)	Fe-55	2.7 (y)	11400	21020	7000	100	0.0070
(n,gamma)	Co-60	5.27 (y)	62.2	21020	50	1	0.0050

Ratio < 1 as specified in 10 CFR 30.35(d) for unsealed form 0.0340

Extractor body: Activated isotopes with half-life greater than 120 days

Reaction	Activated element	Half-life	Specific activity (Bq kg-1)	Weight (kg)	uCi	Appendix B	Ratio (App.B x 10E4)
(n,p)	Ni-63	100.1 (y)	728	300	50	100	0.00005
(n,alpha)	Co-60	5.27 (y)	1090	300	50	10	0.00050

Ratio < 1 as specified in 10 CFR 30.35(d) for unsealed form 0.00055

Required financial assurance for decommissioning per 10 CFR 30.35(d):

For plated foils, \$113000 is required if the calculated ratio divided by 10E10 is greater than 1.

The calculated ratio does not exceed 1, therefore no financial assurance is required for decommissioning the plated foils for the cyclotron.

For activated isotopes in unsealed form, \$225000 is required if the calculated ratio divided by 10E4 is less than 1.

The calculated ratio is greater than 0.1 but does not exceed 1, therefore financial assurance in the amount of \$225,000 is required for decommissioning the cyclotron facility.

Accelerator Equipment

Cyclotron

The Siemens model RDS-111 cyclotron is a self-shielded system capable of accelerating protons to 11 MeV energy for the production of radioisotopes. The shielding provides sufficient attenuation of the neutron and gamma dose levels during production allowing cyclotron to be installed in a 20 ft x 23 ft x 14 ft ceiling height room with normal building construction. The distances between the source of radioactivity and the cyclotron room walls ensure that radiation dose rates during normal operation are below 2.0 mrem/hr outside the room. The operator's station is located outside the cyclotron room.

For a typical Fluorine-18 run, the accelerator beam-on time is about 90 minutes and the typical F-18 production yield is about 1800 mCi. Depending on the radioisotope requirement for the day, a second run may be performed.

Accelerator Equipment description summary:

- Cyclotron Manufacturer: Siemens/CTI
- Model: RDS-111
- Accelerator Energy: 11 MeV
- Maximum Current: 40 microamps
- Typical Current: 35 microamps
- Typical Bombardment Time: 90 minutes
- Typical Production Yield: 1800 mCi F-18 per run
- Target: ^{18}O (p,n) ^{18}F
 ^{16}O (p, α) ^{13}N
- Cyclotron Shielding Construction: Inner core: 30 cm Lead, epoxy, boron carbide
Outer core: 70 cm Polyethylene, boron concrete

Radiopharmaceutical Lab Equipment

Radiopharmaceutical Synthesis Modules

The radiopharmaceutical laboratory has 2 Siemens Chemical Process Control Unit (CPCU) modules for synthesis of PET radiopharmaceuticals. Each CPCU module is housed in a mini cell constructed with 2-inch (5 cm) thick lead shielding.

Delivery Lines

The delivery lines that transfer the F-18 bolus from the accelerator target to the CPCU for radiopharmaceutical (FDG) synthesis are housed in a trench under 10-inch (25 cm) thick concrete. The delivery lines use Argon gas to transfer the F-18 liquid.

The mini hot cells are attached to the primary hot cell used for preparing the radiopharmaceutical doses. This design completely shields the delivery line which is used to transfer the synthesized product (e.g. FDG) to the final product vial in the primary hot cell.

Hot Cells

The radiopharmaceutical lab has 2 lead-shielded hot cells each equipped with 2 remote manipulator arms for remote handling of radioactive materials. The hot cells are constructed of 2-inch thick lead with a transparent lead-shielded viewing window and sealable ports for arm entry into the hot cell. The hot cells are operated under negative pressure and exhausted with HEPA filtration.

BETWEEN:

Accounts Receivable/Payable
and
Regional Licensing Branches

[FOR ARPB USE]
INFORMATION FROM LTS

Program Code: 03210
Status Code: Pending Amendment
Fee Category: 3S
Exp. Date:
Fee Comments:
Decom Fin Assur Reqd: Y

License Fee Worksheet - License Fee Transmittal

A. REGION

1. APPLICATION ATTACHED

Applicant/Licensee: QUEEN'S MEDICAL CENTER, THE
Received Date: 02/08/2011
Docket Number: 3038244
Mail Control Number: 574462
License Number: 53-29377-03
Action Type: Amendment

2. FEE ATTACHED

Amount: _____

Check No.: _____

3. COMMENTS

Signed: Colleen Murnahan

Date: 2-17-2011

B. LICENSE FEE MANAGEMENT BRANCH (Check when milestone 03 is entered / /)

1. Fee Category and Amount: _____

2. Correct Fee Paid. Application may be processed for:

Amendment: _____

Renewal: _____

License: _____

3. OTHER _____

Signed: _____

Date: _____