

**Cook, Jackie**

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**From:** Irene Sakimoto [isakimot@hawaii.edu]  
**Sent:** Wednesday, August 31, 2011 3:50 PM  
**To:** Cook, Jackie  
**Subject:** License amendment request  
**Attachments:** NRCamendmentlist0001.pdf

**RECEIVED**

AUG 31 2011

DNMS

Aloha Jackie,

I would like to amend our NRC License # 53-00017-23, Docket No.: 030-07571, Control: 574626.

We need to add a calibration source that was noted during the last inspection.

The source is has Pu-239 and Am-241 electroplated onto a disc and has an activity of 0.00019 microCuries. It was made by Eckert & Ziegler Analytics on 7/13/10. There is an SRS#: 82922-121.

I've also attached a copy of a list of radioisotopes used by one researcher in Geophysics Department which we would also like to add to the license. The list describes each item in detail.

Please let me know if you need additional information for this request.

Mahalo,  
Irene Sakimoto  
RSO

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Purpose of this application:

The SOEST Isotope lab has small amounts of natural isotopes of Uranium (U-238, U-234), Thorium (Th-232) and Radium (Ra-226) that are used for calibration of non-natural isotope tracer solutions, chemical separation/purification tests, and alpha spectrometer calibration (just U-238 and U-234 in the last case). The isotopes were acquired in 1992 to 1994 in *unlicensable* quantities; the UH RSO was notified when these isotopes were purchased. This application is for a license for materials that have been on hand and in occasional use for nearly two decades because NRC has recently decided to require licenses for naturally-occurring radioisotopes. Most of the inventory in the isotope lab for these isotopes remains unused since the date of receipt; only small quantities are used, primarily in aqueous solution form, for various tests and calibrations, as described below. An additional attached sheet describes the forms, concentrations, activities, and quantities of each test solution present in our lab. All of these isotopes are stored along with our other licensed isotopes, in our locked, restricted access clean room facility in the POST building, either in original form, or dissolved in dilute aqueous acid and stored in TFE (Teflon) bottles. All of the isotopes are alpha emitters, and the lab has two Ludlum radiation survey monitors (one with an  $\alpha$ - $\beta$ - $\gamma$  probe, and another with a  $\beta$ - $\gamma$  probe) that are used to monitor activities during work with radioisotopes, for swipe tests after use, and to monitor spills.

Uranium: License request, 0.1 mCi of 234U and 238U (0.009 mCi of each currently on hand)

We have 26 gm (the minimum purchase amount) of Certified Reference material 112A. This material is high purity U metal and contains secular equilibrium quantities of U-238 and U-234. 1 gm of this was dissolved into 500 ml of  $\sim 1$  N nitric acid in 1994 to make a series of significantly more dilute working solutions from. The concentrated solution (U238-A) and step down solution (U238-B) were only used to make the working solutions (U238-C and U238-D). The latter, which have trivial total activities of  $\sim 4 \times 10^{-9}$  mCi in 1L each of solution, are used to calibrate our 233U tracer solution, and to occasionally test analytical protocols (in these cases, somewhere between 0.01 and 0.1 gm of solution is used). Most of the isotope material remains in the mass spectrometer after use, although a small fraction (1-5%) is transferred to the sewer as solid waste.

In addition, we have 2 Bq each of 238U and 234U electroplated on an alphas spectrometer calibration disk, along with 239Pu and 241Am (the latter were already added to the lab's license). This disk is used primarily for energy calibration of the 24 detectors we have in the lab, and secondarily for efficiency calibration. The disk was purchased in Fall 2010 and we don't anticipate using it more than once every couple of years. It is stored with our other isotopes in our lock, restricted access clean room facility.

Thorium: License request, 0.1 mCi of 232Th (0.023 mCi currently on hand)

We have 3.9 gm of powdered, high purity Th-oxide ( $\text{ThO}_2$ ) on hand, received in Feb. 1992. 100 mg of this was dissolved into 100 ml of 2N nitric acid in 1992 to make a significantly more dilute working solution from. The working solution (Th232-B) has a trivial total activity of  $\sim 6 \times 10^{-9}$  mCi in 1L of solution. It is used to calibrate our 229Th tracer solution, and to occasionally test analytical protocols (in these cases, somewhere between 0.01 and 0.1 gm of solution is used). Most of the isotope material remains in the mass spectrometer after use, although a small fraction (1-5%) is transferred to the sewer as solid waste.

Radium: License request, 0.001 mCi of 226Ra (0.000036 mCi currently on hand)

We have 1328 Bq/g (0.000036 mCi) of radium-226, from National Institute of Standards & Technology, Standard Reference Material 4966, received in Feb. 1994 as an aqueous solution in flame sealed ampoule. This was quantitatively transferred to 500 ml of 2 N HCL to make a concentrated solution (226Ra-A) and a working dilution from that (226Ra-B). Like the other isotopes above, these solutions have trivial activities of 2.66 Bq/g ( $4 \times 10^{-7}$  mCi total) and 0.19 Bq/g ( $1.0 \times 10^{-8}$  mCi total). Only solution B is used to calibrate our 228Ra tracer solutions (made in-house from 232Th solutions every 5 years or so) and to occasionally test analytical protocols (in these cases, somewhere between 0.01 and 0.1 gm of solution is used). Most of the isotope material remains in the mass spectrometer after use, although a small fraction (1-5%) is transferred to the sewer as solid waste.

**SOEST Isotope lab, POST 637/638 Inventory of naturally occurring isotopes of U, Th and Ra**

**A1. Uranium 238 and 234:**

Slightly depleted U metal 26.0g; U-238+U235+U234 activity: 0.0091 mCi (total activity including other daughters is 0.0352 mCi, according to NBL, which is roughly 4x the calculated U-238+U235+U234 activity)

Form: U- metal rod. Source: New Brunswick National Laboratory, Certified Reference Material, 112-A, Minimum purchase amount. Received: Feb/ 1994

**calibration solutions made in sequence from 1 g of this:**

Solution:	238U-A ("concentrated standard")	238U-B ("medium standard")	238U-C ("dilute standard")	238U-D ("dilute standard")
preparation date:	20 Aug 1994	24 Aug 1994	1 Sept. 1994	29 Apr. 1997
Medium:	0.87N HNO3	0.94N HNO3	1.45N HNO3	1.34 N HNO3
soln mass	477.35 g	993.77 g	975.86 g	1020.46 g
238U conc.	4738 ug/g	11.46E ug/g	12.15 ng/g	11.67 ng/g
U-238+234+235 activity†	7170 dpm/g, or 1.5 x 10 <sup>-3</sup> mCi in total solution	17.3 dpm/g	0.0184 dpm/g	0.0177 dpm/g
U-238 = U234 activity‡	3500 dpm/g, or 7.5 x 10 <sup>-4</sup> mCi total	8.47 dpm/g, or 3.8 x 10 <sup>-6</sup> mCi total	9.0 x 10 <sup>-3</sup> dpm/g, or 3.9 x 10 <sup>-9</sup> mCi total	8.6 x 10 <sup>-3</sup> dpm/g, or 4.0 x 10 <sup>-9</sup> mCi total

† (plus unknown amounts of other daughters)

‡ 234U/238U is nominally at secular equilibrium, meaning U238 activity = U234 activity

**A1. Uranium 238 and 234:**

2 Bq of each isotope, electroplated onto a metal disk (along with Pu-239 and Am-241), NIST traceable alpha spectroscopy calibration standard.

**B. Thorium 232:**

Th oxide (ThO2) 3.9g; Th-232 activity 0.023 mCi (plus unknown amounts of other daughters)

Form: white powder. Source: Lindsay Co. via Scripps Inst. of Oceanography. Received: Feb. 1992

**calibration solutions made in sequence from a small part (100 mg) of this:**

Solution:	232Th-A ("concentrated standard")	232Th-B ("dilute standard")
preparation date:	31 March 1992	31 March 1992
Medium:	2N HNO3	2N HNO3
soln mass	920.64 g	1000.32 g
232Th conc.	98.42 ug/g	54.55 ng/g
232Th activity†	24 dpm/g, or 9.9 x 10 <sup>-6</sup> mCi total	0.0133 dpm/g, or 6.0 x 10 <sup>-9</sup> mCi total

† (plus unknown amounts of other daughters)

**C. Radium 226**

Radium Chloride with Barium Chloride carrier; Ra-226 activity 1328 Bq/g (0.000036 mCi)

Form: Aqueous, dissolved in 1.4 M HCl with 1.67mg/g BaCl2 in flame sealed ampoule

Source: National Institute of Standards & Technology, Standard Reference Material 4966. Received, Feb. 1994

**calibration solutions made in sequence from a small part (100 mg) of this:**

Solution:	226Ra-A ("concentrated standard")	226Ra-B ("dilute standard")
preparation date:	6 May 1994	23 May 1994
Medium:	2.08N HCl	2.05N HCl
soln mass	498.86 g	1000.08 g
226Ra conc.	72.8 pg/g	1.037 pg/g
226Ra activity†	2.66 Bq/g, or 4 x 10 <sup>-7</sup> mCi total	0.19 Bq/g, or 1.0 x 10 <sup>-8</sup> mCi total

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DATE

This is to acknowledge the receipt of your letter/application dated AUG 31 2011, and to inform you that the initial processing, which includes an administrative review, has been performed.

There were no administrative omissions. Your application will be assigned to a technical reviewer. Please note that the technical review may identify additional omissions or require additional information.

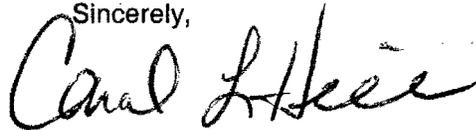
Please provide to this office within 30 days of your receipt of this card:

The action you requested is normally processed within 90 days.

A copy of your action has been forwarded to our License Fee & Accounts Receivable Branch, who will contact you separately if there is a fee issue involved.

Your action has been assigned **Mail Control Number** 575912  
When calling to inquire about this action, please refer to this mail control number.  
You may call me at 817-860-8103.

Sincerely,



Licensing Assistant

BETWEEN:

Accounts Receivable/Payable  
and  
Regional Licensing Branches

[ FOR ARPB USE ]  
INFORMATION FROM LTS ...

Program Code: 01100  
Status Code: Pending Amendment  
Fee Category: 3L 3P  
Exp. Date:  
Fee Comments: 170.11(A)(4)  
Decom Fin Assur Req: Y

### License Fee Worksheet - License Fee Transmittal

#### A. REGION

##### 1. APPLICATION ATTACHED

Applicant/Licensee: HAWAII, UNIVERSITY OF  
Received Date: 08/31/2011  
Docket Number: 3007517  
Mail Control Number: 575912  
License Number: 53-00017-23  
Action Type: Amendment

##### 2. FEE ATTACHED

Amount: \_\_\_\_\_

Check No.: \_\_\_\_\_

##### 3. COMMENTS

Signed: Carl L. Heise  
Date: 9/1/11

#### 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: \_\_\_\_\_