MAR - 6 1997

License No. 20-00297-53
Docket No. 030-00753
Mail Control No. 124174

Thomas E. Vautin
Associate Vice President
for Facilities & Environmental Services
Radiation Protection Office
46 Oxford Street
Cambridge, MA 02138

Dear Mr. Vautin:

This is in reference to your financial assurance and the decommissioning funding plan for License No. 20-00297-53, that you submitted with your letter dated November 25, 1996. We have reviewed the documents and have no further questions at this time.

Your cooperation with us is appreciated.

Sincerely,

Original Signed By:
Pamela J. Henderson

Pamela J. Henderson
Senior Health Physicist
Division of Nuclear Materials Safety

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OFFICE	DNMS/RI	N	DNMS/RI	N				
NAME	SLodhi		PHenderson					
DATE	02/03/97		02/3/97		02/ /97		02/ /97	

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Table 10.3 Acceptable Surface Contamination Levels for Unrestricted Release (in dpm/100 cm^2)			
Nuclides[a]	Average [b,c,f]	Maximum [b,d,f]	Removable [b,c,f]
U-nat, U-235, U-238, and progeny	5,000 α	15,000 α	1,000 α
Transuranics, Ra-226, Ra-228,Th-230, Th-228, Pa-231, Ac-227, I-125,I-129	100	300	20
Th-nat, Th-232, Sr-90, Ra-223,Ra-224, U-232,I-126, I-131, I-133	1,000	3,000	200
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above.	5,000 βγ	15,000 βγ	1,000 βγ

a Where surface contamination by both alpha- and beta-gamma-emitting nuclides exists, the limits established for alpha- and beta-gamma-emitting nuclides should apply independently.

b As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

c Measurements of average contaminant should not be averaged over more than 1 square meter. For objects of less surface area, the average should be derived for each such object.

d The maximum contamination level applies to an area of not more than 100 cm^2.

e The amount of removable radioactive material per 100 cm^2 of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped.

f The average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/hr at 1 cm and 1.0 mrad/hr at 1 cm, respectively, measured through not more than 7 mgrams per square centimeter of total absorber.

10.17 Financial Assurance for Decontamination of Facilities and Equipment

By a separate agreement with the Nuclear Regulatory Commission, the University has placed in escrow $1,500,000 of securities to financially assure final decommissioning of laboratories where radioactive materials are stored and used. Radioactive material use at the University is distributed in small quantities (usually less than 500 μCi) in 40 University buildings, and consists predominately of short-lived material (i.e., half-life less than 120 days). The University's large possession limits are needed to accommodate the large and varied research program. This type and distribution of use coupled with the philosophy of maintaining contamination levels at release levels (see Section 10.16), and a long-standing history of absence of long-lived material spills indicates that there is little concern for long half-life contamination that would require decontamination. This premise is further validated because no laboratory has required decontamination prior to renovation. There are, however, a few exceptions to these conditions. These are: a) a single laboratory that uses unsealed ^{99}Tc, b) decay storage facility, c) the incinerator, and d) a Radiation Protection Office laboratory (Holyoke B24) used for storage

and special containment. The last two have been and continue to be extensively surveyed by the Radiation Protection Office on a routine basis for over twenty years and have not exhibited contamination above release guidance. Also, there are an additional 15 laboratories that use long-lived isotopes (e.g., ^{3}H and ^{14}C) that should be added to the decommissioning list as a precautionary measure. The source of contamination for these labs is expected to be plumbing associated with sinks that are used for the disposal of soluble radioactive materials.

The incinerator is not currently operating while the University is evaluating the options for commercial disposal. It is important to note that in 1987, the incinerator was renovated and an extensive survey identified less than 10 ft^3 of long lived waste, above the natural levels in the refractory brick, requiring disposal. The remainder of the Radiation Protection Office facilities are only for storage awaiting final disposal; surveys of these facilities routinely show no evidence of contamination. The ^{99}Tc laboratory does contain some contamination in a hood area. In a recent decommissioning of a collaborating laboratory at another institution, 16,000 pounds of waste was collected and disposed at a cost of almost $200,000. The collaborating laboratory is significantly larger than Harvard's, and was used for compound labeling, while the Harvard laboratory is used to evaluate radiopharmaceutical compounds. It would be conservative to assume this laboratory would cost $100,000 to decommission properly. In addition, it would be conservative to estimate $10,000 for the dismantling and disposal of about 10 m of plumbing for each of the 15 labs that use long-lived isotopes in large quantities ($150,000 total for these laboratories).

If one were to assume that a similar decommissioning effort were required at the Holyoke laboratory (even though there is no current evidence of contamination) it would be reasonable to add another $100,000 to the needed decommissioning fund.

By adding estimates of $100,000 each for the ^{99}Tc laboratory, Holyoke Laboratory, and the incinerator, $10,000 each for potentially unidentified wastes in the two waste rooms, $150,000 for the 15 labs, and another $50,000 for the decay-storage facility, one could calculate a conservative total requirement of $520,000 for financial assurance for decommissioning. A summary of the total decommissioning costs is included in Appendix 10.1 using the tabulated format specified in NRC Regulatory Guide 3.66 (1990).

Based on other's experience and the historical experiences at the University, it is reasonable to expect that the currently reserved $1,500,000 is more than adequate for future decommissioning under this license. In fact one could argue that the fund could safely be decreased. This margin of additional funding well provides for future considerations and changes in disposal costs.

10.18 Leak Test Procedure

Leak tests are conducted at least every six months on each sealed source in use and each irradiator with the following method:

1. a. Cotton swabs are submerged in a dilute solution of Alconox or Alcohol.

Exhibit 10.1

Decommissioning Cost Estimating Tables

APPENDIX F (Continued)
COST ESTIMATING TABLES

Table 3 (continued)

Work Days

Task	Supervisor	Foreman	Technicians	H.P.	Craftsmen	Laborer	Total	Total Cost
3. Decon/Dismantle Waste Areas	5	5	10	10		10		$7375
- Radwaste Areas								
- Scrap Recovery Areas								
- Other								
4. Decon/Dismantle Service Facilities	5	5	10	10		10		$7375
- Maintenance Shop								
- Decontamination Areas								
- Ventilation Systems								
- Other								
5. Decon/Dismantle Waste Treatment Facilities and Storage Areas on the Site (Including exhume and package contaminated soil and tailings, if any)								
- Fluoride Lagoons								
- Nitrate Lagoons								
- CaF2 Waste Recovery								
- Ground Water Restoration								
- Other								

APPENDIX F (Continued)
COST ESTIMATING TABLES

Table 7

Burial Charges $20,000 ($/m^3)
Surcharges
Per container ( )
Disposal ($/m^3$)

Waste Type	Burial Volume	Unit Cost of Burial	Surcharge	Burial Cost
A	16			
Total				

4. Restoration of Contaminated Areas on Facility Ground

Table 8

Task	Work Days Supervisor	Foreman	H.P.	Clerical	Total	Total Cost
Backfill and Restore Site						

5. Final Radiation Survey

Table 9

Task	Work Days Supervisor	Foreman	H.P.	Clerical	Total	Total Cost
	5		20	10		$7250
Total						

APPENDIX F (Continued)
COST ESTIMATING TABLES

Table 2

Position	Unit Cost for Workers: Basic Salaries ($/yr)	Overhead Rate (%)	Worker Cost/year
Supervisor	60,000	50	300
Foreman	35,000	50	175
Craftsman	30,000	50	150
Technician	30,000	50	150
Health Physicist	45,000	50	225
Laborer	25,000	50	125
Clerical	25,000	50	125
Other			

2. Decontamination and/or Dismantling of Radioactive Facility Components*

	No.	Dimensions			No.	Dimensions
Glove Boxes			(m^3)	Amount of Floor Space		(m^2)
Fume Hood	1	2	(m^3)	Ventilation Ductwork		(#)
Hot Cells			(m^3)	Amount of Wall Space		(m^2)
Lab Benches			(#)	Other		
Sink and Drain	15	150	(#)			

Table 3

Work Days

Task	Supervisor	Foreman	Technicians	H.P.	Craftsmen	Laborer	Total	Total Cost
1. Decon/Dismantle Major Components and/or Processing and Storage Tanks	5	5	10	10		10		$7325
2. Decon/Dismantle Laboratories, Fume Hoods, Glove Boxes, Benches, etc.	1	1	2	1		2		$1250

*Indicate whether component is to be decontaminated to unrestricted release levels or packaged and disposed of at a low-level waste site.

APPENDIX F

COST ESTIMATING TABLES

1. Planning and Preparation

Table 1

Task	Work Days Supervisor	Foreman	H.P.	Clerical	Total	Total Cost
1. Preparation of Documentation for Regulatory Agencies						
2. Submittal of Decommissioning Plan to NRC when required by 10 CFR 30.36(c)(2), 40.42(c)(2), or 70.38(c)(2)*	5		5	3		
3. Development of Work Plans			5			
4. Procuring of Special Equipment			5			
5. Staff Training			5			
6. Characterization of Radiological Condition of the Facility (Including soil and tailings analysis or groundwater analysis, if applicable)						
7. Other						
8. Total	5		20	3		
	$1500		$4500	$375		$6375

* For assistance in preparation of cost estimate for 10 CFR Part 72, consult NRC Office of Nuclear Material Safety and Safeguards.

APPENDIX F (Continued)
COST ESTIMATING TABLES

Table 3 (continued)

Work Days

Task	Supervisor	Foreman	Technicians	H.P.	Craftsmen	Laborer	Total	Total Cost
6. Monitor for compliance, reclean and remonitor, if necessary	3		6	6				$3.50
7. Other (e.g., contractor fees)								

Table 4

Equipment/Supply	Quantity	Cost
Decon. Equipment & Supplies		$5000
Detection Equipment		$10,000

3. Packaging, Shipping, and Disposal of Radioactive Wastes

Table 5

Waste Type	Volume (m^3)	No. of Containers	Type of Containers	Unit Cost of Container	Cost of Container
Total					

Table 6

Distance Shipped _____ (miles)
Unit cost for shipment _____ ($/mile/truckload)
Additional charges
Overweight _____ ($/mile)
Surcharges _____ ($/mile)

Waste Type	No. of Shipments	Unit Cost for Shipping	Distance Shipped	Surcharge	Transportation Cost
Total					

6. Site Stabilization, Long-Term Surveillance (if applicable)

Table 10

Task	Work Days Supervisor	Foreman	H.P.	Clerical	Total	Total Cost

Cost Summary

Planning and Preparation	$	6,375
Decon/Dismantle	$	23,375
Equipment and Supplies	$	15,000
Burial Charges	$	320,000
Radiation Surveys	$	10,400
	$	375,150
Contingencies	$	144,850
Total:	$	520,000

BETWEEN:

LICENSE FEE MANAGEMENT BRANCH, ARM
AND
REGIONAL LICENSING SECTIONS

(FOR LFMS USE)
INFORMATION FROM LTS

PROGRAM CODE: 01100
STATUS CODE: 2
FEE CATEGORY: EX 3L 2C
EXP. DATE: 19950630
FEE COMMENTS: 170.11(A)(4)12/89-1/9
DECOM FIN ASSUR REQD: Y

LICENSE FEE TRANSMITTAL

A. REGION I

1. APPLICATION ATTACHED
APPLICANT/LICENSEE: HARVARD UNIVERSITY
RECEIVED DATE: 970130
DOCKET NO: 3000753
CONTROL NO.: 124174
LICENSE NO.: 20-00297-53
ACTION TYPE: FIN. ASSURANCE

2. FEE ATTACHED
AMOUNT: ---/---
CHECK NO.: ---/---

3. COMMENTS
Pulled out of 12/1856 (Revenue).

SIGNED Ma. A. Serbian
DATE 1/30/97

B. LICENSE FEE MANAGEMENT BRANCH (CHECK WHEN MILESTONE OBTAINED AND ENTERED--√)

1. FEE CATEGORY AND AMOUNT: EX 3L 2C Cont'n of 124174

FEE NOT REQUIRED

2. CORRECT FEE PAID. APPLICATION MAY BE PROCESSED FOR:
AMENDMENT ---√---
RENEWAL ---
LICENSE ---

3. OTHER ---

SIGNED ---
DATE ---

RECEIVED BY LFDCB
Date 2/19/97
Log 76 5 II (97)
By BB
Date Completed 2/19/97

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