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MS-16
P-9

John D. Kinneman
U.S. Nuclear Regulatory
Commission
Region I
475 Allendale Road
King of Prussia, PA 19406-1415

Dear Mr. Kinneman:

This letter is in response to your request for additional information regarding renewal of our license 20-00882-03 as indicated in your letter to us dated 1 Sept 93 (Docket No. 030-00761 and 030-1141; and Control No. 113940 and 116980). The following information is offered in response in the same order as requested:

1. At this time we have replaced Robert L. Gallagher on our Radiation Use Committee (RUC) with Chris Messier. His resume is attached. We have also replaced Donna Carey with Mike Weinberg. Both Donna Carey in the past and currently Mike Weinberg sit on the Committee as administrative representatives for V.C. Conti, who has many years of both training and experience with radioactive material (RAM). We have made no other changes to our RUC. We wish to point out, however, that from time to time members will leave and be replaced. The RUC will allow allow only those persons who meet the qualifications stated in 10 CFR 33.15(b) as a minimum to serve on the committee. These records are available for your inspection.

2. We are a major research University and are requesting a type A broad scope license as defined in 10 CFR 33.11(a). This paragraph indicates "not exceeding quantities specified in the license" and "the quantities specified are usually in millicurie range." We have tried to to define our needs as accurately as possible, i.e., all limits of material with atomic numbers 1-83 listed separately in item 5 of our application. We do not intend to purchase or possess unneeded RAM. We believe our request of 100 mCi of any radionuclide with atomic numbers 1-83 on line A. of item 5. is clearly very modest for our size institution and solely to allow unexpected new research to proceed without the delay of time needed for a license amendment. We hope you will agree with our assessment that the total quantity possessed is unimportant in comparison to the proper handling of RAM which we have shown is important to our institution.

   With respect to limits for items we omitted by oversight, they are listed here:

Item	Max. Limit Possessed
BB, Cs-137 sources.....	600 mCi
CC, Cs-137, CPN gauges.....	50 mCi
DD, Am-241, CPN gauges.....	500 mCi

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Designated Official Record
Date December 22, 1997

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3. UMASS/Amherst - any academic, service or research building on campus; see map enclosed and Belchertown Orchard and Deerfield Farm facilities.

- Cranberry Station, Glen Charley Rd., Wareham, MA 02538
- Marine Station, Lanesville Station, Gloucester, MA 01930
- Waltham Field Station, 240 Beaver St., Waltham, MA

4. Less than the full RUC can act for the committee. Five members including the Chairperson, V.C Conti or his assistant, the RPO and 2 other members will be considered a quorum for this committee.

5. a. Ancillary personnel, e.g., janitorial and security personnel, are not allowed in any restricted areas. However, we provide annual training to custodial personnel and supervisors on hazards of RAM as they pertain to our on Campus use, as part of our "Right to Know policy" to ensure that workers do not encounter unwarranted RAM contamination.

We have also provided similar training regarding the hazards of use of RAM on campus to our public safety department from time to time. However, as is indicated in our renewal in item 10, our EH&S office has a trained technician on duty 24 hours/day, every day. This person responds to all emergencies or incidents with public safety (via radio contact). This ensures that these personnel do not encounter unwarranted exposure or contamination. We will continue refresher training of these personnel on an infrequent basis.

b. We have already indicated in our Radiation Safety Manual that authorized users are responsible for ensuring that their personnel (not all are students) are properly instructed in "all requirements prescribed in this manual", which is the body of our license program. This manual is in all labs for review.

6. On page 4.1 of our manual, responsibilities of the RUC clearly include "reviewing the radiation safety aspects of proposals for the procurement and use of radioisotopes and for modification of existing operating procedures, involving the use of RAM." On page 4.2, responsibilities of the RPO clearly include "reviewing radioisotopes use procedures." These reviews are done at the RPO's office and at laboratories where RAM will be used. These reviews are then finally reviewed by the RUC at a scheduled meeting. We use our form "Application for Authorization to Use Radioisotopes" for this review. All these records are kept and have been reviewed by the NRC every 2 years during inspection.

7. We have answered this question a number of times before. Our RPO, another health physicist, 2 technicians, and the remainder of the 29 person EH&S staff serve UMASS/Amherst full time, i.e., 40 hours/week normal time and on call all the time. Amherst College and Mount Holyoke College have very small research programs using RAM. These schools are physically very close by and although separately licensed they receive radiation safety service by our EH&S department, just as our UMass labs/personnel do. We have substantiated for years that we provide full time radiation safety service to all schools. This is not a new question nor an unproven situation.

8. Our Radiation Protection Officer and our Radiation Protection Program Manager are both professional health physicists. Both of these people are in the labs where RAM is used on a weekly basis performing radiation safety surveys. These "routine" surveys, as outlined in our manual on page 8.1 and page 14.66, are performed at least monthly on a scheduled basis. The schedule is rotated such that one of our health physicists is scheduled to survey each lab once each calendar quarter. During these surveys (or audits) they review all radiation safety program requirements. These surveys are all recorded/filed and have been inspected by the NRC many times in the past.

9. During routine surveys in the labs, performed by our health physicists and our radiation safety technicians, on site review of all radiation safety problems/concerns with RAM users is continually practiced. This we have found to be our best "refresher" training method. At other times as deemed necessary the RUC or EH&S office will issue memos to RAM users and/or post notices in labs regarding various radiation safety issues. We have found this "refresher" training to be most effective.

10. Our portable radiation detection equipment consists of various GM survey meters with pancake and end-window probes. Most instruments have both mR/hr and cts/min scales; some have only cts/min scales. All instruments have scales and ranges appropriate to the tasks (as has been noted in many past NRC inspections). We also have ion-chambers with mR/hr and R/hr scales and a neutron rem counter.

11. Our LKB liquid scintillation counter is properly calibrated using manufacturer supplied unquenched standards, e.g. H-3, C-14 standards, to ensure that the unit is operational. These standards/blank have been counted/logged in daily whenever the LSC was to be used by our technicians. This data is charted regularly, i.e., counting rate as ordinate and date as abscissa. A horizontal line is drawn at the mean for each standard and background, and control lines are drawn at plus and minus 2 standard deviations.

    The instrument performance is monitored; i.e., if count is within 2 standard deviations, the instrument is considered operational; if a count falls outside, a series of repeated measurements is made immediately and the scatter of these points used to make a decision on service requirements. Trend lines are also observed. If a slow trend is noticed, it may mean that new mean and new control lines should be computed. Instrument service is also considered as necessary.

    Standards are decay corrected as necessary and counting efficiency is calculated regularly for use in analysis of samples, wipes, etc.

12. a. Alpha sources will be leak tested every 3 months as required by license condition.

    b. Our sealed sources are all inventoried. All sources requiring leak test every 6 months are wipe tested in May and November of each year. Alpha sources are tested every 3 months. Wipes are taken directly on source surfaces; sources in devices are wiped directly on the surface whenever possible, or if not possible the wipe is taken on the surfaces of the device in which the sealed source is permanently or semi-permanently mounted or stored on

which one might expect contamination to accumulate.

These wipes are then analyzed on appropriate counting equipment, e.g., LSC, GPC, gamma scintillation counter. This equipment is appropriately calibrated using quantified counting sources traceable to NIST. Calculations are performed on counting data and recorded on our leak test form (see enclosed). (These have been reviewed by NRC during on site inspection many times.)

13. Our procedures for the use of P-32 on Page 14.35 of our manual already recommend the use of Lucite shields for use of " mCi quantities" in paragraph 5. We have also defined " mCi quantities" below 10 mCi. These shields are research standards for this work and offer full upper body/face protection.

14. All proposed research involving the use of RAM is reviewed by the RPO to ensure compliance with all NRC regulations including 10 CFR 20.103. Air monitoring will be performed to evaluate radioactive materials (RAM) in air whenever a release may be possible due to research procedures. If radioactive material releases are possible during research procedures, these procedures will only be performed in fume hoods and/or special glove boxes capable of capturing volatile RAM to ensure that releases of RAM are kept far below the concentrations specified in Appendix B, Table I, Column I. Restricted areas will be established as necessary to meet full compliance with 10 CFR 20.103.

Carrier-free radioiodinations are only performed in special glove boxes located in fume hoods to meet the very low release limits of 10 CFR 20 (see our safety manual section 14.33 and attached facility description).

We are aware of the new 10 CFR 20 regulations and NRC Reg Guide 8.25 "Air Sampling in the Workplace". We will conduct air sampling as necessary according to the recommendations in Table 1 of Reg Guide 8.25.

15. a. All animal housing facilities meet current standards of USDA and NIH.

b. Only authorized users and their trained researchers/graduate students, i.e., radiation safety trained research personnel, will be allowed to provide care to animals in facilities where this work is done. This work will be done in accordance with RUC approved procedures (see "Criteria for Review of In-Vivo Use of RAM in Small Lab Animals by Authorized Users" in our manual appendix. No "animal caretakers" will handle RAM animals or work in an area where these RAM animals are kept.

c. All cages, trays, etc. will be cleaned in RAM animal use facilities by authorized users and/or his research personnel.

d. All labs and animal facilities utilizing RAM are maintained and locked by authorized users and/or his research staff whenever they are unattended by authorized users.

16. a. Security of RAM is maintained by locking doors to all labs where RAM is stored in unrestricted areas. Alternatively researchers

may place RAM in a locked freezer or refrigerator or other similar integrity cabinet.

b. Security at all use locations will be maintained by locking RAM in high integrity storage containers, or in locked labs/rooms, or in locked vehicles.

17. Our "Radioisotope Status Form" is a multi-use form. Whenever RAM above excepted quantity limits are shipped, we will (as we always have) add our emergency phone number to the form along with all the other DOT/NRC required information.

18. EH&S personnel review all requests for RAM as indicated in paragraph A of "Control/Accountability of RAM" to ensure our NRC limits are not exceeded. Whenever a user requests more than UMASS is authorized of any single radionuclide, we will not allow this order to be placed. Indeed, we have chosen our limits to meet our needs and have not experienced any problems of this kind in the past. We continue to maintain compliance with this license requirement as we have shown during NRC on site inspections.

19. Specific sewerage limits for each laboratory have never been assigned here at any laboratory. For the past 17 years the NRC has approved our sanitary sewer disposal policy which we have clearly detailed. Every past NRC inspection has reviewed our attention to compliance with 10 CFR 20.303. Each time we have clearly shown that our institutional disposal of RAM into the sanitary sewer was well within compliance. The chart we sent you "Allowable ----------" was only for NRC review and clearly was to show how great our daily flow of water to the sanitary sewer is (our annual is obviously far greater).

Indeed, our instructions to lab personnel using RAM on page 6.4 of our manual does not have maximum disposal, limits. We believe that researchers should only have limitations placed upon them when necessary. We see no need to place this requirement on our researchers when we have been (and continue to) meeting compliance with this regulation for many years without this burdensome requirement.

As we have shown NRC inspectors each time they come to inspect our RAM inventory and disposal, recordkeeping is readily available to verify that sanitary sewer releases do not exceed regulatory limits. This data is continuously monitored by EH&S also. We have never come near either annual or concentration limits established by NRC regulation.

20. a. We will revise our long standing current procedure to require that all RAM waste will be held for 10 half-lives before disposal by decay.

b. We specifically request disposal by decay-in-storage for isotopes with a half life of up to 120 days. The following requested information is offered:

(1) The increase in half-life above 65 days is requested for the disposal of S-35 and any other isotopes which may become necessary to our broad scope research goals of the present and future. The volume of waste expected per year is difficult to

estimate. In our opinion, based on past experience, we estimate that we generate between 50 and 100 drums of waste each year. However, this is only an estimate and the actual number could vary considerably outside our estimated range.

(2) Instruction provided to researchers consists of our Radiation Safety Manual; an initial research protocol review which includes a thorough discussion/plan for all RAM disposal with students/researchers actually using the RAM; a posted copy of our EH&S produced "Waste Management at UMASS" (enclosed); and continuous review of research practices regarding the use of RAM during our frequent, i.e., at least monthly, surveys of all RAM use areas performed and recorded by our EH&S radiation safety personnel. This has been our practice for many years and our NRC inspection record can attest to the effectiveness of this practice.

(3) The instrumentation we use for survey of our waste is a GM survey meter with a pancake probe. The detectable activity (MDA) which we can achieve is twice the natural background radiation level.

(4) We have already indicated in our renewal in item 11 that we use 55 gal. drums. This is certainly an industry standard. Clearly it has been shown many times that painted 55 gal. steel drums have enough integrity to last many years under dry storage conditions. We have no means to evaluate container integrity for any period of time other than our own experience and industry standards review. Using proper liners and protection from "the elements" we have found that 55 gal. steel drums, DOT17H or equivalent are capable of long term safe storage of RAM.

(5) A description of our excellent Flammable Storage Building was already provided along with a scale drawing in our renewal in item 11. It has also been inspected by NRC a number of times in the past. However, we provide an additional description below:

4.1 FLAMMABLE STORAGE BUILDING

The storage building is located just off Campus Center Way, across (south) from the Physical Plant building. The building is expressly designed and constructed to store hazardous material. Each bay is separated by eight-inch thick, reinforced concrete walls; the outer walls are covered by fire-retarding materials, including asbestos-containing Transite. All bays are equipped with automatic sprinklers (except Room 7 Bay 4 - automatic dry chemical suppression system), as well as portable extinguishers and fire hoses (just inside bay entrances). An emergency drench shower is located in bay 2. Sloped drainage from within the bays is directed to a dry well east of the building; bay 2 has a removable plug in the floor drain (just inside entrance). An explosion-safe telephone, #5-3233, is located outside bay 2 on the retaining wall of the service aisle.

21. We wish to retain license condition 16. At present time we are trying to fund another incinerator which will meet our State DEP criteria. When this unit is erected, we will again want to dispose of RAM by incineration.

22. As you request (and we have been performing), we confirm that prior to approval of individuals who will be authorized to use our irradiators, these individuals will:

    a. be given on-site/at the irradiator training in proper operation of the unit as outlined in the Gammators 50 manual by an authorized user or a member of the EH&S Radiation Safety Office.

    b. be evaluated on-site by an authorized user or a member of the EH&S Radiation Safety Office to ensure they understand proper safe operation of this very safe and simple to operate unit.

    c. be provided with a written copy of the operating procedures. (Emergency procedures are already in our manual).

23. Our form "Application for Authorization to Use Radioisotopes" on page 14.15-14.17 and referred to in item V. Application for Use clearly states that authorized user training is documented.

24. These irradiators, Gammator 50, may be used or stored in any UMASS/Amherst building which meets local and State codes for occupancy. Irradiators will be moved on campus from one location to another only when necessary to accommodate research goals. Our Physical Plant Dept., which has experienced staff and proper equipment, will move these irradiators only on request of the RPO. The move will be planned ahead of time. A member of the Radiation Safety Office will accompany the Physical Plant workers throughout the entire move. A radiation survey of exposure levels around the irradiator will be made before and after the move to ensure no changes in the shielding integrity. Should an incident occur during the move, e.g., unit topples over or is dropped, a radiation survey will be performed immediately. If no damage to shielding integrity is visible and no increases in radiation levels are found, the move will continue. If damage/increase in radiation levels are found, they will be evaluated by the RPO. Appropriate steps will then be taken to ensure worker safety, minimize exposure, and have damage repaired.

    Off campus transportation of these irradiators will be in full compliance with 10 CFR 71.

25. We will dispose of RAM waste within 2 years of the date it is generated.

26. We wish to change the quantity of each isotope requested in item 5 of our license renewal to avoid the expense/need for a decommissioning funding plan (DFP) required by 10 CFR 30.35(c)(2). Specifically we wish to change the limits of all isotopes requested in either sealed or unsealed form as listed below in order to meet the requirements of 10 CFR 30.35(c)(3). We have provided a proper certificate of financial assurance for decommissioning, i.e.letter of

intent, according to the criteria indicated in 10 CFR 30.35(f)(4) in place of a DFP. A copy of our response to an NRC letter to us from Dr.Shanbaky, control no. 112353,is attached.

	RAM Requested	Form	Max. Amount Possessed
A.	Any byproduct material with Atomic Nos. 1-83, inclusive, which have a half-life of 120 days or less.	Any unsealed	100 mCi of each byproduct material with Atomic Nos. 1-83, inclusive, which have a half-life of 120 days or less.
B.	Any byproduct material in App. C of 10 CFR 20 with a half-life greater than 120 days	Any unsealed	10^5 times the applicable quantity in App. C of 10 CFR 20. For a combination of isotopes R, as defined in 10 CFR 30.35 (a), divided by 10^5 is less than or equal to 1.
C.	P-32	Any	1.5 curies
D.	S-35	Any	1.5 curies
E.	I-125	Any	0.5 curies
F.	Cr-51	Any	0.5 curies
G.	I-131	Any	0.2 curies
H.	Cd-115	Any	0.1 curies
I.	In-114	Any	0.1 curies
J.	Pm-148	Any	0.1 curies
K.	Pt-193m	Any	0.1 curies
L.	Cobalt 60	Sealed sources	800 millicuries
M.	Polonium 210	Alpha sources	2 millicuries
N.	Hydrogen 3	Foils	2 curies
O.	Hydrogen 3	Titanium Tritide targets	10 curies
P.	Hydrogen 3	Any	10 curies
Q.	Americium 241	Sealed sources	150 millicuries
R.	Cesium 137	Sealed sources	450 millicuries
S.	Nickel 63	Detector Foil	200 millicuries

T.	Californium 252	Sealed sources (Savannah River Model ALC or SALC)	5 micrograms
U.	Cadmium 109	Sealed source	50 millicuries
V.	Iron 59	Sealed source	50 millicuries
W.	Americium 241	Foils	1200 millicuries
X.	Americium 241	Sealed neutron sources	400 millicuries
Y.	Plutonium	Sealed sources	64 grams encapsulated as two Pu-Be neutron sources
Z.	Cesium 137	Sources, Kay Ray gauges	50 mCi ea (600 mCi total)
AA.	Cesium 137	Sealed source (Campbell Pacific Nuclear Corp. Model CPN 131)	Not to exceed 10 millicuries per source (50mCi total)
BB.	Americium 241	Sealed neutron source (Campbell Pacific Nuclear Corp. Model CPN 131 or other similar model gauges)	Not to exceed 50 millicuries per source 500 mCi total)

Thank you for your continued attention to our renewal request.

Respectfully,

S.F. Conti
Vice Chancellor for Research
Graduate Studies and
Economic Development

x.c. K. Sastry, Chair RUC