

NOTE TO: License Fee Management Branch, ADM

FROM: Region III

SUBJECT: VOIDED APPLICATION

mailed

Control Number 85094

Applicant Univ. of Wisconsin-Madison

Date Voided 12/28/88

Reason for Void Combined with Control

No. 86037 after review.

Signature

W. ADAM

Attachment:
Application

9004040192 881228
REG3 LIC30
MATLSLICENSING PDR

LFMB
No facsimile
12/13/89

MC 3 d

21

BETWEEN:

LICENSE FEE MANAGEMENT BRANCH, ARM
AND
REGIONAL LICENSING SECTIONS

(FOR LFMS USE)
INFORMATION FROM LTS

PROGRAM CODE: 02110
STATUS CODE: 2
FEE CATEGORY: EX 78
EXP. DATE: 19860331
FEE COMMENTS:

LICENSE FEE TRANSMITTAL

A. REGION III

1. APPLICATION ATTACHED

APPLICANT/LICENSEE: WISCONSIN-MADISON, UNIVERSITY OF
RECEIVED DATE: 880323
DOCKET NO: 3003465
CONTROL NO.: 385094
LICENSE NO.: 48-09843-18
ACTION TYPE: AMENDMENT

2. FEE ATTACHED

AMOUNT:

CHECK NO.: 0

3. COMMENTS

SIGNED
DATE

B. LICENSE FEE MANAGEMENT BRANCH (CHECK WHEN MILESTONE 03 IS ENTERED / Y)

1. FEE CATEGORY AND AMOUNT:

FEE EXEMPT

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

3. OTHER _____

SIGNED
DATE



University of Wisconsin-Madison

SAFETY IS OUR CONCERN...

SAFETY DEPARTMENT
317 N. Randall Avenue
MADISON, WISCONSIN 53715
608 262-8769 • 262-0667

February 29, 1988

Ms. Evelyn R. Matson
U.S. Nuclear Regulatory Commission
Region III - Materials Licensing Section
799 Roosevelt Road
Glen Ellyn, IL 60137

Dear Ms. Matson:

Enclosed is an application for an amendment to the University's broad scope license, 48-09843-18, for a specific field use of radionuclides. The amendment is for the use of small amounts of tritiated water involving several species of birds. As you may remember, we have had several similar applications approved in the past few years.

I believe that this amendment request includes all the information required to license field use of byproduct material. If you need additional information, please contact me as soon as possible. The researcher would like to begin the work in the near future.

Thank you for your time and assistance with this request.

Sincerely,

Sue Engelhardt

Sue Engelhardt
Radiation Safety Officer

MA 25
FREE EXEMPT
2B, 10, 11(a)(9) cl 19/87

CONTROL NO 85094

MAR 23 1988

RECEIVED

MAR 23 1988

REGION III



State of Wisconsin \ DEPARTMENT OF HEALTH AND SOCIAL SERVICES

January 27, 1988

DIVISION OF HEALTH
MAIL ADDRESS:
1 WEST WILSON STREET
P.O. BOX 309
MADISON, WISCONSIN 53701-0309

RECEIVED

JAN 28 1988

SAFETY DEPT.

UW-Safety Department
Mr. John Lorenz
317 N. Randall Ave.
MADISON WI 53715

RE: Dr. Karasov: Study of Energy Consumption in Birds

Dear Mr. Lorenz:

We have reviewed the plan and calculations submitted for approval of the project utilizing tritiated water (or $3\text{H}_2\text{O}$) in the Leopold Memorial Reserve.

The estimated population dose is negligible and does not pose a health risk to humans.

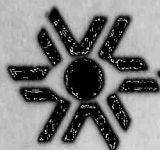
The project is approved. If you have any questions, please call (608) 273-5184.

Sincerely,

Mark C. Bunge, Deputy Chief
Section of Radiation Protection

MCB/ba

CONTROL NO. 8509 4



University of Wisconsin-Madison

SAFETY IS OUR CONCERN...

SAFETY DEPARTMENT
317 N. Randall Avenue
MADISON, WISCONSIN 53715
608 262-8769 - 262-0667

January 5, 1988

Mr. Larry McDonnell
Radiation Protection Section
Health & Social Services
5712 Odana Road
Madison, WI 53711

Dear Larry:

Dr. William Karasov, who has performed several field studies using tritiated water in the past two years, would like to perform a study of energy consumption in birds using ^3H as $^3\text{H}_2\text{O}$. I have attached a copy of the proposed use for your review.

These birds do not represent a likely source of food directly to humans. In the attached copy of the estimated dose to humans, I have nevertheless estimated the dose from consumption of the birds.

The avian variety of malaria used in this study does not infect humans and is present in up to 40% of the wild population of the bird species that will be used.

I will again need a letter of approval from you to submit to the Nuclear Regulatory Commission. Thank you for your timely review of this application.

Sincerely,

John Lorenz
John Lorenz
Health Physicist

Field Use Amendment

Use of tritiated water in the study of energy requirements of three Passerine birds during wintertime and the raising of nestlings.

Dr. William Karasov and Beth Baechler

Radionuclide: ^3H as doubly labelled water ($\text{H}^3\text{H}_2\text{O}$ -18).

Amount: Maximum of 5.0 mCi total over 2 years in this study.

Research Protocol: Copy Attached.

Release of Material to the Environment: Due to the nature of this study and the metabolism of $^3\text{H}_2\text{O}$, most of the radionuclide will be lost to the environment as water vapor during respiration, in urine, and in fecal matter. The only portion of the ^3H that will be recovered will be that removed in the blood samples.

Estimate of dose to humans: copy of calculations attached.

Permission to use property: As is noted in the attached Research Protocol, the Sand County Foundation, the owner of the land where the study will be conducted, has agreed to the study. A letter to this effect is included with this application.

Letter from State Health Authority: Letter from Lawrence McDonnell, Chief, Radiation Protection Section, Department of Health and Social Services, attached.



RECEIVED

NOV 10 1987

SAFETY DEPT.

Department of Wildlife Ecology

226 Russell Laboratories, 1630 Linden Drive, Madison WI 53706 608-262-2671

School of Natural Resources
College of Agricultural and Life Sciences
University of Wisconsin-Madison

November 6, 1987

Sue Engelhardt
Health Physics Supervisor
Safety Department
317 N. Randall Ave.
Madison WI 53715

Dear Sue,

Here is another proposed project involving field use of tritiated water. Please call me if it is lacking. Thanks for your assistance.

Best wishes,

Bill

William H. Karasov
Assistant Professor

Enclosure

PROPOSAL TO USE TRITIATED WATER IN A FIELD STUDY
(submitted November 1987)

Principal investigator: Dr. William H. Karasov, Department of Wildlife Ecology, University of Wisconsin-Madison

Research assistant: Beth Baechler, Department of Wildlife Ecology and Department of Veterinary Science, University of Wisconsin-Madison

Why this study is important

The ecological success of animals is sometimes dependent on the maximum rate at which they can make energy available for their maintenance, growth, or reproduction. This concept of a maximal rate of energy flow has great utility for helping us understand the ecological and evolutionary forces shaping life history strategies, behavior, and patterns of animal distribution and abundance. The concept has practical value also in that it may lead to more sensitive tests of the ecological impact on wildlife of disease due to pathogens or environmental contaminants. However, because data are lacking for almost every vertebrate as to what the maximal level is and what determines it, the idea's explanatory, predictive, and practical utility remains almost unexploited by biologists.

The objectives of this proposed research are to determine for several species of Passerine birds their physiological limits to maximal energy flow, the extent to which these limits actually operate on normal birds living in their natural environment, and whether these limits change in an ecologically important way in response to infection by a naturally occurring pathogen, as theory predicts they should. Laboratory studies are used to establish the physiologically dictated maximal rates of energy flow. Then, the energetics of free-living birds are studied during two periods of the year that are most energetically demanding - during the raising of nestlings and during wintertime. Finally, birds are experimentally infected with the blood borne parasite Plasmodium in order to test whether malaria lowers the maximal rate of energy flow and thereby depresses reproduction and ability to maintain mass and energy balance in wintertime.

Location of the study. The study will be performed at the Leopold Memorial Reserve which lies in the northeast corner of Sauk County, Wisconsin. The Reserve covers 1300 acres, and is managed by the Sand County Foundation as a private cooperative wildlife area. Permission to use tritiated water at the Reserve was secured previously.

Methods. The doubly labeled water method (Lifson and McClintock, J. Theor. Biol. 12:46-74, 1966) allows an investigator to measure daily CO₂ production and hence energy metabolism in wild animals. Dr. Karasov has extensive experience with the method (c.f. Karasov, Oecologia 51:253-259, 1981). Adult birds or nestlings of three species of Passerine birds (House Wrens [Troglodytes aedon], American Goldfinches [Carduelis tristis], and Black-capped Chickadees [Parus atricapillus]) will be captured and injected with tritiated water (H³HO) during several field experiments over the course of two years. Birds will receive doseages of H³HO according to body mass, 1 mCi/kg. Following equilibration (1 hour), 100 microliters of blood will be collected from the jugular vein.

Then the birds will be released at their site of capture. Birds will be recaptured 1 or 2 days later and another blood sample drawn. Glass capillary tubes containing blood samples will be flame sealed and transported to the University of Wisconsin-Madison. The blood samples will be distilled in Dr. Karasov's laboratory at the University, and the water counted for H^3HO by liquid scintillation. Because the birds are small (≤ 0.015 grams usually) injection amounts per bird will be small and we estimate that the total amount of H^3HO to be used will be less than 5 milliCuries over the entire 2 year study.

Proper authorization to work with the wild birds will be secured from campus R.A.R.C., and authorization for the parts of the work involving pathogens will be secured from the Biological Safety Office.

Possible hazards. The possible hazards resulting from this study are probably negligible. Although the study will be performed with free-living birds, we have good control over our system at most times. Recapture success of nestlings will be 100% and because parent birds will be feeding their young we expect to recapture most of them. During wintertime we will trap birds at feeders which they visit daily and do not move far from. Access to the study areas by people not involved in the study can be controlled.

The H^3HO which is lost by the birds will be primarily in the form of water vapor in the atmosphere. Water in the excreta will evaporate also. The biological half-life of H^3HO in small birds is one day (Karasov, unpublished data). Should any predator consume one of the birds, H^3HO will similarly "washout" in a few days.

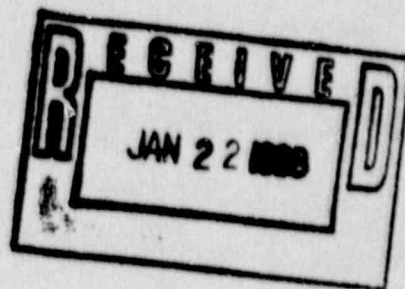
the sand county foundation

P.O. BOX 3037 • 201 WAUBESA STREET • MADISON, WISCONSIN 53704
• PHONE 608-244-3511

RECEIVED
JAN 20 1988
SAFETY DEPT.

January 18, 1988

Dr. William H. Karasov
Assistant Professor
Department of Wildlife Ecology
University of Wisconsin-Madison
226 Russell Laboratories
1630 Linden Drive
Madison, WI 53706



Dear Bill:

This letter serves as formal permission from the Board of Directors of the Sand County Foundation as owner and/or manager of property at the Leopold Memorial Reserve for you to continue use of the Leopold Reserve properties through December 31, 1988 for further research in animal energetics.

This permission includes your use of tritiated water in order to measure the energy expenditure of free-living rodents on the Leopold Memorial Reserve property.

Sincerely,

Reed Coleman
Chairman

RC:jlz

✓ copy to John Lorenz

ESTIMATED DOSE TO HUMANS

The dose to humans from this study should be totally non-existent. The release of 5.0 mCi of ^3H is inconsequential when compared to the naturally produced environmental equilibrium concentration of ^3H , estimated to be 69 Megacuries (Ref. 1).

The estimated dose from the 69 Megacuries of environmental ^3H is 6.9×10^{-4} millirem per year per person. The dose from an additional 5.0 mCi of ^3H , used in this study, would increase the annual dose due to ^3H in the environment by approximately 5.0×10^{-14} millirem per year (Ref. 2).

The above estimate of dose to humans assumes that the ^3H used in the study is all released to the atmosphere as tritiated water and is mixed uniformly. The other estimate of the dose to humans would be if someone would ingest the entire population of radiolabelled birds (5.0 mCi over two years) immediately after the injection of the ^3H . In this case the dose to the individual would be approximately 353 mRem, assuming an effective half-life of 12 days (Ref. 3) and an S-Factor of 1.7×10^{-7} Rad/uCi-hr (Ref. 4).

The above calculation does not reflect the amount of ^3H which would be removed during the dressing of the birds (ie. the removal of the entrails, feathers, head, etc.), which is estimated to be 50% of the total. An additional loss of ^3H as $^3\text{H}_2\text{O}$ would occur during the cooking process, when moisture is driven from the meat. If this is estimated to be another 5%, the total amount of ^3H available for ingestion would be 2.38 mCi, or a total dose of approximately 167 millirem. The dose from any one bird, initially containing 15 microcuries, would be less than 2 mrem.

REFERENCES

1. Moghissi, A. A., & Carter M.W. Environmental Tritium. Messenger Graphics, 1975.
2. Cohen, J. J., & Higgins, G. H. The Socioeconomic Impact of Low-Level Tritium Releases to the Environment. Messenger Graphics, 1975.
3. ICRP Report Number 10. Report of Committee IV on Evaluation of Radiation Doses to Body Tissue from Internal Contamination due to Occupational Exposure. Pergamon Press, 1968.
4. Medical Internal Radiation Dosimetry Pamphlet Number 11. "S," Absorbed Dose per Unit Cumulated Activity for Selected Radionuclides and Organs. Society of Nuclear Medicine, 1975.

CONTROL NO. 85094