



PIONEER HI-BRED INTERNATIONAL, INC.  
PLANT BREEDING DIVISION

DEPARTMENT OF BIOTECHNOLOGY RESEARCH  
7300 NW 62ND AVENUE • BOX 38  
JOHNSTON, IOWA 50131-0038  
PHONE (515) 270-3650

April 29, 1985

U.S. Nuclear Regulatory Commission  
Region 3  
799 Roosevelt Road  
Glen Ellyn, IL 60137

Attn: Materials Licensing Section

Gentlepersons:

Applicant: *MAY 10 1985*  
Check No. *614628*  
Amount: *5*  
Type of Fee: *3 Months*  
Date check rec'd: *6/14/85*  
Received By: *[Signature]*  
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BRANCH

Pioneer Hi-Bred International, Inc., holds by-product materials license No. 14-20402-01, which allows us to purchase and use radioisotopes for research purposes. Since obtaining that license we have gained considerable experience in our new facility, and our work has expanded appreciably. The arrival of new personnel and movement into new research areas requires that we amend our by-products material license to reflect our changing needs.

First, we have added five new staff members, Drs. L.R. Beach, J.P. Duvick, D.M. Grant, G.H. Huffman and B. Martin, who have extensive experience in the use of radioisotopes. I would like to include their names on our license as project managers. I believe that their experience warrants the authorization to use all materials for which we are currently licensed (please see attached resumes).

I would also like to update the resumes of three project managers who are currently listed on the license. I (Arthur Weissinger) attended an extensive course in radiation safety at the Harvard School of Public Health in the summer of 1984. During that course, I learned a great deal about a wide-array of radioisotopes, as well as experience in the use of a number of radiation detection devices. I feel that this experience, and my continuing responsibility as radiation safety officer here at Pioneer, warrant my authorization for the use of all materials for which we are currently licensed (I am presently authorized to use only  $^3\text{H}$ ,  $^{14}\text{C}$ , and  $^{32}\text{P}$ ).

Drs. Steven P. Briggs and Marc C. Albertsen have been working with  $^{32}\text{P}$  labelling of nucleic acids under my supervision for the last year. Both have demonstrated considerable ability and attention to the hazards associated with the use of this radionuclide. Their experience and awareness of radiation safety warrant their authorization for the use of  $^{32}\text{P}$  without my direct supervision. I will, of course, continue to monitor their contamination, radwaste management, etc., in my role as radiation safety officer.

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CULTURE GROW THROUGH GENETIC RESEARCH

CONTROL NO. 78858 MAY 2 1985  
REGION III

U.S. Nuclear Regulatory Commission  
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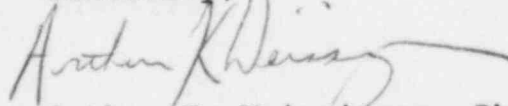
A new technique for the sequencing of nucleic acids, which replaces the use of  $^{32}\text{P}$  with the use of  $^{35}\text{S}$ , has now come into common use. There are a number of advantages to using  $^{35}\text{S}$ , the primary advantage being the ability to plan experiments in a more convenient time frame than is allowed by the very short half-life of  $^{32}\text{P}$ . Our present license does not allow the possession or use of the amount of  $^{35}\text{S}$  required for this procedure. I would like to amend our license to allow the possession of up to 900 millicuries of  $^{35}\text{S}$ .

Finally, I was advised by Mr. John Madera of the U.S. NRC, who visited our facility in September of 1984, that it would be appropriate for us to allow our low-level  $^{32}\text{P}$  waste to decay in storage, rather than having it carried away by a commercial radioactive waste management firm. We now have facilities and procedures in place which would facilitate such decay in storage. All  $^{32}\text{P}$  waste is monitored carefully and is logged as it is stored in plastic lined steel drums for disposal. Additionally, all radioactive waste materials are stored in a separate locked facility which is reserved for this purpose. Access to this area is limited to the radiation safety officer and assistants under his direct supervision. Material will be maintained in this secure storage area for approximately 12 half-lives, or until residual counts are at background (less than 0.05 millirem per hour).

The residual radioactivity in liquid waste samples will be monitored by sampling all waste containers and counting aliquots in the liquid scintillation counter. Residual radioactivity in or on solid wastes will be monitored with a Geiger-Muller survey meter.

I believe that we can meet all NRC requirements for the above license amendments. Please contact me if I may clarify anything, or if additional information is needed.

Sincerely,



Arthur K. Weissinger, PhD  
Radiation Safety Officer

lks

Enclosures

CONTROL NO. 7 8 8 5 8

Larry R. Beach

Date of Birth: November 29, 1950

Education

Degree	Major	University	Date
Bachelor of Arts	Zoology	University South Florida	1972
Doctor of Philosophy	Oncology	University of Wisconsin-Madison	1979

Previous Positions Held in Which Radioisotopes Were Used

Research Scientist, CSIRO, Plant Industry, Canberra, Australia, January 1983 - December 1984

Postdoctoral Fellow with Dr. Richard D. Palmiter, September 1979 - December 1982, Biochemistry Department University Washington, Seattle, WA

Howard Hughes Medical Institute, Research Associate, September 1979 - August 1980

Senior Fellow PHS, Environmental Health Sciences, National Research Service Award, August 1980 - December 1982

Current Position

Project Manager, January 1985 - present, Department Biotechnology Research, Pioneer Hi-Bred International, Inc., Johnston, IA 50131

Prior Research Experience with Radioisotopes

Ten years experience handling radioisotopes in research. Isotopes used include  $^{32}\text{P}$ ,  $^3\text{H}$ ,  $^{35}\text{S}$ ,  $^{14}\text{C}$ ,  $^{109}\text{Cd}$ ,  $^{125}\text{I}$ ,  $^{65}\text{Zn}$ .

$^{32}\text{P}$  has been used extensively in my research; at one point at the University of Wisconsin-Madison, I used 50 mCi/week without mishap. This research was closely monitored by the University Radiation Safety Committee.

Relevant Training

Attended classes on radioisotope use, University of Wisconsin-Madison.

Completed a course on radiation and microbiological safety at the University of Washington-Seattle.



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Jonathan P. Duvick

Born: March 25, 1954

<u>Degree</u>	<u>Major</u>	<u>University</u>	<u>Date</u>
B.A.	Biology	Earlham College Richmond, IN	1976
Ph.D.	Plant Pathology	Univ. of Wisconsin Madison, WI	1982

Positions held

Research Assistant, Univ. of Wisconsin-Madison	1977-82
Research Associate, Univ. of Nebraska-Lincoln	1982-84
Research Plant Pathologist, Dept. of Biotechnology Research, Pioneer Hi-Bred Int., Inc.	1984-present

Experience with radioisotopes

As a prerequisite to handling isotopes at the University of Wisconsin-Madison, had a brief course (reading material) and a written exam on radiochemistry and radiation safety. From 1979-1982, had on-the-job experience in handling  $^3\text{H}$  and  $^{14}\text{C}$ , and was in charge of ordering and inventory of radionuclides for major professor's lab at the University of Wisconsin-Madison. Chemicals used included  $^{14}\text{C}$  and  $^3\text{H}$  sugars for in vivo labelling studies, and  $^3\text{H}$ -sodium borohydride for in vitro labelling. Amounts handled ranged from 10  $\mu\text{Ci}$  to approximately 5  $\mu\text{Ci}$ . Received formal training in handling isotopes and calculating activities, etc., in a biochemistry methods course at the University of Wisconsin-Madison. Continued work with isotopes ( $^{14}\text{C}$ -bicarbonate,  $^3\text{H}$ -borohydride) at the University of Nebraska-Lincoln, 1982-1984.

David M. Grant

Date of Birth: August 11, 1949

Education

Degree	Major	University	Date
Bachelor of Science	Biology	State Univ. of New York at Stony Brook	1971
Doctor of Philosophy	Genetics	The University of Chicago	1977

Positions Held

Graduate Student, 1971-1977, The University of Chicago, Chicago, IL

Postdoctoral Fellow, 1977-1980, Duke University, Durham, NC

Postdoctoral Trainee, 1980-1981, St. Louis University, St. Louis, MO

Assistant Research Professor, 1981-1983, St. Louis University, St. Louis, MO

Project Manager Molecular Genetics, 1983-present, Dept. of Biotechnology Research, Pioneer Hi-Bred Int'l, Inc., Johnston, IA

Experience with Radioisotopes

All of my research experience has been in areas which required the use of radioisotopes. I have had extensive experience in both in vivo and in vitro labelling of nucleic acids and proteins with  $^3\text{H}$ ,  $^{14}\text{C}$ ,  $^{32}\text{P}$  and  $^{125}\text{I}$ , including nick translation of DNA, 5'- and 3'-labelling of nucleic acids and iodination of proteins. I am familiar with the use of autoradiography and scintillation counting as methods of isotope detection.

Formal training in the safe handling of radioisotopes was obtained in a three day course given by the Radiation Safety Officer at St. Louis University. In addition, each of the professors under whom I have worked stressed proper handling, storage and disposal of radioactive materials.



Gary H. Huffman

Date of Birth: January 28, 1954

Education

Degree	Major	University	Date
Bachelor of Science	Biochemistry	Michigan State University	1976
Doctor of Philosophy	Biochemistry	University of Wisconsin-Madison	1981

Previous Positions Held in Which Radioisotopes Were Used

Undergraduate Student (Honors Research), 1972-1976, Michigan State University, East Lansing, MI 48824

Graduate Student, 1976-1981, University of Wisconsin-Madison, Madison, WI 53706

NIH Postdoctoral Trainee/Senior Fellow, 1981-1984, University Washington, Seattle, WA 98195

Current Position

Manager, Plant Molecular Genetics Project, January 1985-present, Department of Biotechnology Research, Pioneer Hi-Bred International, Inc., Johnston, IA 50131

Prior Research Experience with Radioisotopes, 1975-1984

$^3\text{H}$  and  $^{14}\text{C}$  in vivo labeling, isolation and handling of RNA and DNA in single and double label experiments

$^{32}\text{P}$  in vitro labeling of DNA by nick translation, end labeling and in vitro DNA synthesis for hybridization, sequencing and double label experiments.

Detection of radioisotopes by autoradiography, liquid scintillation counting and geiger counter.

Expected use of radioisotopes at current position is the same as prior use; have not had occasion to use radioisotopes so far at Pioneer Hi-Bred International.

Education and Training  
Gary Huffman  
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Formal Training and Certification for Use of Radioisotopes

Fall 1976 - Isotopic Techniques: Biochem 656 1 cr. Grade: AB  
Laboratory course with lectures, taken at University of Wisconsin-Madison; included theory and applications, including handling and detection of various beta and gamma emitters.

1977 - Certification for handling of radioisotopes ( $^3\text{H}$ ,  $^{14}\text{C}$  and  $^{32}\text{P}$ ) at University of Wisconsin-Madison, after reading Radioisotope Safety booklet and passing a written examination on the material covered in the booklet.

1982 - Certification for handling Radioisotopes ( $^{32}\text{P}$ ) at University of Washington

Barry A. Martin

Date of Birth: Sept. 2, 1952

Education

Degree	Major	University	Date
BS	Horticulture	Michigan State Univ.	1974
MS	Post Harvest Physiology	Michigan State Univ.	1976
PhD	Plant Biochemistry	Michigan State Univ.	1980

Positions Held

Graduate Assistant, 1975-1980, Michigan State Univ., E. Lansing, MI

Research Associate, 1980-1983, North Carolina State Univ., Raleigh, NC

Research Associate, 1983-1985, Univ. of Illinois, Urbana, IL

Project Manager, Germination, 1985-Present, Dept. of Research Specialists, Pioneer Hi-Bred International, Inc., Johnston, IA

Experience & Training with Radioisotopes

At Michigan State University I attended a three credit lab-lecture course on radioisotope use, handling and safety. Since 1976 I have used isotopes continually in my research. I have experience with  $^{32}\text{P}$ ,  $^{14}\text{C}$ , and  $^{35}\text{S}$  for in vivo labelling experiments and in vitro enzyme assays. I have also had the responsibility of record keeping, wipe testing and monitoring the laboratories I have worked in since 1980.



Arthur K. Weissinger

Date of Birth: February 11, 1949

Education

Degree	Major	University	Date
Bachelor of Science	Biology	University of Alabama in Huntsville	1974
Doctor of Philosophy	Crop Science	North Carolina State University	1981

Previous Positions Held in Which Radioisotopes Were Used

Research Technician, 1975-1977, University of Alabama, Birmingham

Research Technician, 1977-1978, North Carolina State University

Research Assistant, 1978-1981, North Carolina State University

Current Position

Molecular Biologist, 1981-present, Department of Biotechnology Research, Pioneer Hi-Bred International, Inc., Johnston, IA

Prior Research Experience with Radioisotopes

Attended a course on radiation protection at the Harvard School of Public Health in August of 1984. This course was specifically designed for training radiation protection officers and workers in nuclear power generating and nuclear weapons plants.

Received formal training in proper use of radioisotope at a course in recombinant DNA methodology sponsored by the Genetics Society of Canada in the University of Ottawa, Ontario in August, 1982. Included in the course were nick translation of DNA using  $^3\text{H}$ -d-thymidine triphosphate or  $^{32}\text{P}$ -dCytidine triphosphate and 3' and 5' end-labeling of DNA using  $^{32}\text{P}$ -d adenosine triphosphate or 3'-dATP, [ $\alpha$   $^{32}\text{P}$ ] cordycepin 5'-triphosphate. Work involved calculation of isotope quantities for each reaction and stressed proper handling of each isotope including storage, waste handling and emergency procedures. Quantities of isotope used in each procedure were approximately 100  $\mu\text{Ci}$  per reaction, although smaller amounts were sometimes used. Isotope was detected with Geiger counter or autoradiography.

Education and Training  
Arthur K. Weissinger  
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Informal training (on-the-job) and laboratory experience includes work with  $^{35}\text{S}$ -phenyl isothiocyanate-labeled amino acids- (University of Alabama at Birmingham). Work involved preparation of samples (including calculation of activity), quantitation of product by HPLC and liquid scintillation counting, and appropriate disposal of all waste.