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REGION I

November 16, 2001

Docket No. 03020681

Control No. 130368

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Pamela J. Henderson  
Senior Health Physicist  
Nuclear Materials Safety Branch 2  
Division of Nuclear Materials Safety  
Nuclear Regulatory Commission  
Region I  
475 Allendale Road  
King of Prussia, Pennsylvania 19406-1415

07-13441-02  
030-20681

**Subject: Response to Application for Renewal of License Control No. 130368**

Dear Pamela:

The following information is provided to assist you in your review of our license renewal application dated September 26, 2001 for Nuclear Regulation Commission License No. 07-13441-02.

1. Our renewal application is requesting 20 Curies of Hydrogen-3 instead of 200 Curies because we no longer need that capacity for synthesis work. Originally DuPont Pharmaceutical operated under our license conditions at our site and had a possession limit of 200 Curies, but they obtained a separate license for their synthesis facility in building S-115 on March 5, 1999 (License No. 07-00455-40) and we have decided not to retain that possession limit on our license renewal.
2. The Americium-241 check source in a Packard Liquid Scintillation Counter was erroneously omitted from Item 6 of our license renewal application and will be added.
3. Field studies have been conducted on our site license for many years. Enclosed is summary of recent field studies that have been conducted on our site since 1999 to the present. In item No. 6.2 of our license application I described the purpose for conducting field studies, procedures for record keeping, test procedures and decontamination surveys. For your review, I have included copies of our standard operating procedures for Stine-Farm C-14 Studies, records of past studies, a Farm Station C-14 License Check list, an Environmental Studies Project Planning Sheet, a radiation training packet for DuPont field stations and a letter from the Delaware Office of Radiation Control declining the opportunity to review our plans for field studies because the radioactive material in question was not NARM but rather byproduct material.
4. Both the Glasgow Site (Bldg 300) and Delaware Technology Park (DTP) will remain on our license. Their names will be added to Item 9 (Facilities) on page 17 of our license application.
5. The chairman of our radiation safety committee, Eric Benner, was selected by our facilities manager based on his technical knowledge and experience for using radioisotopes on our site for the past 10 years. He had served as a research member of our radiation committee for several years and was willing to devote time to the position in addition to other responsibilities he had within the facility.
6. The Radiation Safety Committee is comprised of the RSO of record, Norman W. Henry III, alternate RSO's, a management representative and research members (Principle Investigators) currently using radioisotopes. Quarterly meetings are scheduled and held by the radiation safety officer, who also plans the agenda, takes the minutes and conduct the meetings. The RSO is responsible for being present at all meetings and if not able to attend a meeting will reschedule as needed.
7. On pages 10 - 12 of our license application the duties and responsibilities of the radiation safety committee are itemized. As per the NRC guidance for Type A board scope licensees, the radiation safety committee will only have flexibility to make program changes and revise procedures in the areas of training, audits, monitoring instruments, material receipt and accountability, occupational dose, safe use and emergency procedures and surveys. These changes will be documented in the minutes of the radiation committees meetings, reviewed and approved by the committee. The changes will be in accordance with regulatory requirements and license conditions. They will not decrease the effectiveness of the radiation safety program and will not be implemented until the radiation staff is trained in the revised procedures. As part of the radiation committee's annual audit program the effectiveness of the program changes will be evaluated.

130368

NMSS/RGNI MATERIALS-002

8. Item 8 of our license application discusses training requirements for users of radioisotopes. All radioisotope users are required to attend a 8 hour radiation protection seminar on radiation theory, a site orientation and an annual update (refresher training) on program changes. Candidates for authorized users applying for principle investigator status must complete a principle investigator's form (see special additional training, page 15 of license application) and provide background information on their training and experience. The radiation safety committee will approve a principle investigator if he has a college degree at the bachelor level, or equivalent training and experience in the physical or biological sciences or in engineering and 40 hours of additional training and experience related to radioactive materials.
9. Currently we are not doing any tritium gas labeling or loose material generation in any of our buildings on site. Nor do we anticipate doing this work in the near future, however, if the need arises we may designate an area for that purpose and notify you of our plans and location of the building and room number.
10. On page 17 of our license application, Facilities and Equipment are discussed including the joint occupancy and operation of the DuPont Pharmaceutical Company (NRC license # 07-00455-40) within the Stine-Haskell Research Center. Since our application was submitted in September 2001, the DuPont Pharmaceutical Company has announced that it will be leaving the site by the end of this year and terminate all research activities. Bristol - Myers Squibb purchased DuPont Pharmaceuticals and will be responsible for decommissioning their buildings on site, therefore there is no need to describe control measures to differentiate license materials.
11. All transfers of radioactive material within our facility must be to approved users. When a transfer is planned a user must notify the RSO, Asst RSO or his designate of the transfer (e-mail) and document on their inventory tracking form that a transfer has been made. Upon receipt of the radioactive material the user adds this amount to his inventory tracking form. Quarterly, all users having radioactive materials in their possession receive a request from the RSO to verify their current inventory.
12. As per our phone discussion last Thursday (November 8, 2001) this item (11.5.2) of our application is currently under review by the NRC in Washington, DC. We are expecting guidance from your agency on this issue.
13. In item 11.6 an Interim Storage facility is discussed. Originally this facility and plan were developed to store radioactive materials should the Barnwell facility in South Carolina close or no longer accept radioactive waste from outside compacts. Since waste disposal facilities are available at this time, we are not storing waste and will submit a new plan for interim storage when disposal facilities become unavailable.
14. The Decommissioning Funding Plan (DFP) costs are reviewed annually by our chief financial officer and reflect estimates for inflation, prices of goods and services, for changes in facility conditions and operations. While our last and most recent DFP was in 1997 to cover increased amounts of isotopes for DuPont Pharmaceutical's synthesis laboratory, we no longer have that need (they have a separate license and DFP), so that the \$10,200,000 financial assurance amount exceeds our current license needs for decommissioning. Per your recommendation we will plan on reviewing and evaluating our cost estimates at least once every five years when the amounts or types of material at the facility change.

Enclosed for your review are an revised copy of our Renewal Application incorporating changes in response to your request. Also included are copies of C14 Field Plot Procedures, Records of Use, Training, and a letter from the State of Delaware on Field Studies. If you have any questions, please contact the Site Radiation Safety Officer, Norman Henry on (302) 366-5250.

Sincerely,

*Deborah H. Tandraich for Joe Montovino*

Joseph Montovino  
Facilities Manager  
Stine-Haskell Research Center

REVISED: 11/12/01

NRC License Renewal Application  
Type A License of Broad Scope  
September 4, 2001

License No. 07-13441-02  
Expiration Date: 10/31/2001  
Program Code: 03610

E.I. du Pont de Nemours & Co. (Inc.)  
Stine-Haskell Research Center  
P.O. Box 30, Elkton Road  
Newark, Delaware 19714-0030

Contact:  
Mr. Norman W. Henry, III  
Radiation Safety Officer  
302-366-5250 (voice)  
302-451-4545 (fax)  
Norman.W.Henry@usa.dupont.com

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# APPLICATION FOR MATERIAL LICENSE

Estimated burden per response to comply with this mandatory collection request: 7.4 hours. Submittal of the application is necessary to determine that the applicant is qualified and that adequate procedures exist to protect the public health and safety. Send comments regarding burden estimate to the Records Management Branch (T-8 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0000), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

**INSTRUCTIONS: SEE THE APPROPRIATE LICENSE APPLICATION GUIDE FOR DETAILED INSTRUCTIONS FOR COMPLETING APPLICATION. SEND TWO COPIES OF THE ENTIRE COMPLETED APPLICATION TO THE NRC OFFICE SPECIFIED BELOW.**

**APPLICATION FOR DISTRIBUTION OF EXEMPT PRODUCTS FILE APPLICATIONS WITH:**

DIVISION OF INDUSTRIAL AND MEDICAL NUCLEAR SAFETY  
OFFICE OF NUCLEAR MATERIALS SAFETY AND SAFEGUARDS  
U.S. NUCLEAR REGULATORY COMMISSION  
WASHINGTON, DC 20555-0001

**ALL OTHER PERSONS FILE APPLICATIONS AS FOLLOWS:**

**IF YOU ARE LOCATED IN:**

CONNECTICUT, DELAWARE, DISTRICT OF COLUMBIA, MAINE, MARYLAND, MASSACHUSETTS, NEW HAMPSHIRE, NEW JERSEY, NEW YORK, PENNSYLVANIA, RHODE ISLAND, OR VERMONT, SEND APPLICATIONS TO:

LICENSING ASSISTANT SECTION  
NUCLEAR MATERIALS SAFETY BRANCH  
U.S. NUCLEAR REGULATORY COMMISSION, REGION I  
475 ALLENDALE ROAD  
KING OF PRUSSIA, PA 19406-1415

ALABAMA, FLORIDA, GEORGIA, KENTUCKY, MISSISSIPPI, NORTH CAROLINA, PUERTO RICO, SOUTH CAROLINA, TENNESSEE, VIRGINIA, VIRGIN ISLANDS, OR WEST VIRGINIA, SEND APPLICATIONS TO:

SAM NUNN ATLANTA FEDERAL CENTER  
U. S. NUCLEAR REGULATORY COMMISSION, REGION II  
61 FORSYTH STREET, S.W., SUITE 23785  
ATLANTA, GEORGIA 30303-8931

**IF YOU ARE LOCATED IN:**

ILLINOIS, INDIANA, IOWA, MICHIGAN, MINNESOTA, MISSOURI, OHIO, OR WISCONSIN, SEND APPLICATIONS TO:

MATERIALS LICENSING BRANCH  
U.S. NUCLEAR REGULATORY COMMISSION, REGION III  
801 WARRENVILLE RD.  
LISLE, IL 60532-4351

ALASKA, ARIZONA, ARKANSAS, CALIFORNIA, COLORADO, HAWAII, IDAHO, KANSAS, LOUISIANA, MONTANA, NEBRASKA, NEVADA, NEW MEXICO, NORTH DAKOTA, OKLAHOMA, OREGON, PACIFIC TRUST TERRITORIES, SOUTH DAKOTA, TEXAS, UTAH, WASHINGTON, OR WYOMING, SEND APPLICATIONS TO:

NUCLEAR MATERIALS LICENSING SECTION  
U.S. NUCLEAR REGULATORY COMMISSION, REGION IV  
611 RYAN PLAZA DRIVE, SUITE 400  
ARLINGTON, TX 76011-8064

**PERSONS LOCATED IN AGREEMENT STATES SEND APPLICATIONS TO THE U.S. NUCLEAR REGULATORY COMMISSION ONLY IF THEY WISH TO POSSESS AND USE LICENSED MATERIAL IN STATES SUBJECT TO U.S. NUCLEAR REGULATORY COMMISSION JURISDICTIONS.**

**1. THIS IS AN APPLICATION FOR (Check appropriate item)**

- A. NEW LICENSE
- B. AMENDMENT TO LICENSE NUMBER \_\_\_\_\_
- C. RENEWAL OF LICENSE NUMBER 07-13441-02

**2. NAME AND MAILING ADDRESS OF APPLICANT (include ZIP code)**

E. I. duPont de Nemours and Co., Inc.  
Stine-Haskell Research Center  
P.O. Box 30, Elkton Road (Rt. 2)  
Newark, Delaware 19714-0030

**3. ADDRESS WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED**

Stine-Haskell Research Center  
P.O. Box 30, Elkton Road (Rt. 2)  
Newark, Delaware 19714-0030

**4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION**

Norman W. Henry, III

**TELEPHONE NUMBER**

(302) 366-5250

**SUBMIT ITEMS 5 THROUGH 11 ON 8-1/2 X 11" PAPER. THE TYPE AND SCOPE OF INFORMATION TO BE PROVIDED IS DESCRIBED IN THE LICENSE APPLICATION GUIDE.**

**5. RADIOACTIVE MATERIAL**

a. Element and mass number; b. chemical and/or physical form; and c. maximum amount which will be possessed at any one time.

**6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED.**

**7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING EXPERIENCE.**

**8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS.**

**9. FACILITIES AND EQUIPMENT.**

**10. RADIATION SAFETY PROGRAM.**

**11. WASTE MANAGEMENT.**

**12. LICENSE FEES (See 10 CFR 170 and Section 170.31)**

FEE CATEGORY N/A AMOUNT ENCLOSED \$

**13. CERTIFICATION. (Must be completed by applicant) THE APPLICANT UNDERSTANDS THAT ALL STATEMENTS AND REPRESENTATIONS MADE IN THIS APPLICATION ARE BINDING UPON**

THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATION ON BEHALF OF THE APPLICANT, NAMED IN ITEM 2, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PARTS 30, 32, 33, 34, 35, 36, 39, AND 40, AND THAT ALL INFORMATION CONTAINED HEREIN IS TRUE AND CORRECT TO THE BEST OF THEIR KNOWLEDGE AND BELIEF.

WARNING: 18 U.S.C. SECTION 1001 ACT OF JUNE 25, 1948 62 STAT. 749 MAKES IT A CRIMINAL OFFENSE TO MAKE A WILLFULLY FALSE STATEMENT OR REPRESENTATION TO ANY DEPARTMENT OR AGENCY OF THE UNITED STATES AS TO ANY MATTER WITHIN ITS JURISDICTION.

**CERTIFYING OFFICER - TYPED/PRINTED NAME AND TITLE**

Joseph J. Montovino, Manager, Facilities Services

**SIGNATURE**



**DATE**

9-26-01

### FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	AMOUNT RECEIVED	CHECK NUMBER	COMMENTS
			\$		
APPROVED BY				DATE	

**Item No. 5: Material to be Possessed**

Stine-Haskell Research Center  
P.O. Box 30, Elkton Road (Rt. 2)  
Newark, Delaware 19714-0030

<b>5(a) Byproduct</b>	<b>5(b) Chemical and/or Physical Form</b>	<b>5(c) Maximum amount of radioactivity which licensee may possess at any one time</b>
A. Any byproduct material with Atomic Numbers 3-83, inclusive, except as shown below:	A. Any	A. Not to exceed 10 millicuries of each radionuclide and 200 millicuries total
B. Carbon 14	B. Any	B. 20 Curies
C. Hydrogen 3	C. Any	C. 20 Curies
D. Iodine 125	D. Any	D. 1 Curie
E. Iodine 131	E. Any	E. 1 Curie
F. Chromium 51	F. Any	F. 1 Curie
G. Phosphorous 32	G. Any	G. 1 Curie
H. Phosphorous 33	H. Any	H. 1 Curie
I. Sulfur 35	I. Any	I. 5 Curies
J. Nickel 63	J. Plated Sources	J. Not to exceed 15 millicuries/foil
K. Chlorine 36	K. Any	K. 200 millicuries
L. Americium 241	L. Sealed source	L. Not to exceed 0.001 millicuries per sources and 0.002 millicuries total

L. Check sources in Packard liquid scintillation counter.

## **Item No. 5.1: Sealed Sources Possession**

Due to the nature of research and development, the number of sealed sources for each radionuclide changes quickly with the needs of the business and the state of the art. The maximum quantity of radioactive material that will be contained in each sealed source and the maximum quantity for each radionuclide are provided in Item #5. At this time, large sealed sources for specific listings by model number and manufacturer, e.g., irradiators, instrument calibrators, are not in possession. Section 6.1 of the application provides the various uses for the sealed sources in our possession.

There are approximately thirty electron-capture detectors used by the research community at Stine-Haskell Research Center. Each of these sealed sources contain not more than 15 mCi Ni-63. These sealed sources are wipe tested on a six-month basis to ensure the integrity of the unit.

### **Item No. 6.1: Purpose for Use**

Stine-Haskell Research Center  
P.O. Box 30, Elkton Road (Rt. 2)  
Newark, Delaware 19714

The type A specific license of broad scope is intended to accommodate those institutions involved in an extensive radioactive material program where the demand is great for a variety of radionuclides for many uses. The license may authorize any use of byproduct radioactive material by anyone in accordance with review and approval procedures established by the Radiation Safety Committee. Therefore, individuals are not named on the license as users of radioactive material nor are radionuclides limited to narrow, specific uses. However, a general description of the purpose of various uses are:

1. Synthesis of radiolabeled compounds and polymers
2. Metabolic studies in plants and animals
3. Virological and bacteriological research
4. Process development
5. Analytical standards and studies
6. Studies of metabolism, stability and environmental fate of agricultural chemicals and associated products.
7. Pharmokinetic studies in animals.

Sealed sources will be used for, or in support of research and development. Various uses of byproduct materials as sealed sources are:

1. Reference sources
2. Physical measurements such as gauging, thickness, density, leveling, etc.
3. Electron capture detectors for gas chromatographs
4. X-ray fluorescence excitation sources and x-ray production sources.
5. Static elimination

## **Item No. 6.2: Field Studies**

Stine-Haskell Research Center  
P.O. Box 30, Elkton Road (Rt. 2)  
Newark, Delaware 19714

Byproduct materials (radiolabeled agriculture chemicals) will be used in small field plots for studies of metabolism, stability, and environmental fate of agricultural chemicals and associated products. No single test plot will use an amount in excess of 10 millicurie of byproduct material. Maximum amount of radioactivity in use at Stine Farm test area at any one time will not exceed 70 millicuries of carbon -14 and 5 millicuries of hydrogen-3.

Crops or soil will be sprayed or treated at various times during the growing season using a small hand applicator and protective clothing. The treated plots will be surrounded by a wire fence and adequately labeled with appropriate NRC radiation symbols and wording. All plant material on test plots will be harvested for additional studies or disposal at the DuPont Experimental Station.

All users will be approved in advance by a Crop Protection representative of the Site Radiation Safety Committee. A record will be maintained of the action taken in approving each use. In addition, this activity will be provided oversight by the Stine Radiation Safety Officer during the annual management audit of the radioisotope program.

Plots used for field studies will be documented to background levels at the conclusion of each field study. At the conclusion of each field study, the procedures provided in Field Plot Test Procedures will be used for decontamination and survey. (See page 8)

### **Item No. 6.3: Field Plot Test Procedure**

The following has been added to DuPont Crop Protection Standard Operating Procedure titled "SOP for Stine Farm C-14 Field Studies":

#### **6.0 PLOT TESTING FOLLOWING EXPERIMENT TERMINATION**

6.1 Prior to considering the part of the plot in question to be decommissioned, all caution signage designating the area will remain in place and the following will be done:

6.1.1 All vegetation (if any) will be removed and sent to the Experimental Station for incineration as radioactive waste.

#### **6.1.2 Soil Testing**

6.1.2.1 Six to eight soil core samples will be taken to a depth of approximately 18 inches. Cores will be divided into smaller segments. Corresponding segments from each core will be pooled, thoroughly mixed, and analyzed for carbon-14 by combustion and liquid scintillation counting (LSC).

6.1.2.2 Background will be defined by combustion analysis of soil samples taken outside of the plot area. Recovery of carbon-14 from the soil will be determined by analyzing soil from outside the plot area spiked in the lab with a known quantity of carbon-14. Comparison of these results will be made with LSC analysis of vials spiked with the same quantity of carbon-14.

6.1.2.3 Soil will be removed from the plot to the level where soil radioactivity is at background.

6.1.2.4 If soil contains radioactivity in the deepest segment, deeper cores will be taken for analysis, and further soil removed if needed.

6.1.2.5 Removed soil will be sent to the Experimental Station for incineration.

6.1.2.6 Soil removed from the plot will be replaced with soil from outside the plot area.

## **Item No. 7: Individuals Responsible for Radiation Safety Program**

### EXECUTIVE MANAGEMENT

The radiation safety function is supported by site Crop Protection management. Research management controls and reviews the radiation safety program through a research representative on the Radiation Safety Committee. Research management also participates in the annual lab audits conducted with the Radiation Safety Committee.

Organization chart enclosed as Attachment 5

### RADIATION SAFETY COMMITTEE

The Radiation Safety Committee will consist of members designated as follows:

- Chairperson
- Radiation Safety Officer(s)
- Management Representative, who interacts with and represents senior management, ensuring management involvement.
- Research representative of groups using radioactive materials
- Administrative members who support the radiation safety program, but not as users or as evaluators of radioactive material use requests

The Committee reviews and approves new Committee members nominated by management. Management involvement provides the necessary support and delegated authority. The Radiation Safety Officer (RSO), and Chairman of the RSC are appointed by Management and their credentials submitted to the NRC for approval. A list will be maintained of current committee members and their appropriate training and experience.

NRC approval will be obtained when replacing the Committee Chairperson and RSO(s). The previous chairperson, Len Davis, no longer uses byproduct material under this license. Eric Benner currently serves a chairperson. His credentials to be the chairperson are attached for NRC review and approval. (See page 49.)

Generic qualifications of a research representative:

- Familiarity with license conditions and research programs involving the radioisotopes in the group represented
- Ability to evaluate radioisotope use proposals and audit research and radiation safety programs
- Ability to develop appropriate radiation safety policies, such as ALARA targets
- programs to the research community and management

The Radiation Safety Committee will meet at least four times per year. Official meetings will require a quorum consisting of four members, including at least one of the Radiation Safety Officers. Committee proceedings will be documented and the minutes will be reviewed, approved by the Committee and kept on file.

Most of the Committee's work will be handled through the circulation to individual member of purchase and use requests. When Committee approval is required at least three members will be required to approve purchase and use of radioisotopes. Any single member may challenge a proposed use. The Committee will only have flexibility to make program changes and revise procedures in the areas of training, audits, monitoring instruments, material receipt and accountability, occupational dose, safe use and emergency procedures and surveys.

### **RSC Duties and Responsibilities**

- Oversee uses and users of radioisotopes and ensure that exposures will be kept within State and Federal guidelines, and As Low As Reasonably Achievable (ALARA).
- Establish and oversee a Radiation Safety Program that will provide a high level of protection for employees and full compliance with applicable regulations.

Upon the Committee's initiative or upon a user's request, the RSC will evaluate the procedures and programs in place. The ALARA principle and existing license conditions will be used in developing any revisions, or in reaffirming existing procedures. The Committee may revise procedure and program after indicating:

1. The reason for the change
2. The radiation safety issues evaluated
3. How the change will be implemented/communicated

- The RSC will authorize all uses of radioisotopes and will ensure that all radioisotope use complies with applicable NRC regulations. It will review the completed use requests and the principal investigator credentials when approving authorized users and uses of licensed material. Three Committee signatures will indicate Committee authorization.
- The Radiation Safety Officer may directly approve purchases and transfers involving 1 mCi or less of radioisotopes currently used at the Site. The RSO will make available to the Radiation Safety Committee a periodic summary of all purchases so that they can stay informed of the type and level of research activity.

- The criteria for approving radioactive material users include:
  - a. familiar with site NRC requirements applicable to lab users
  - b. familiar with applicable NRC regulations 10 CFR Parts 19 & 20
  - c. understanding of radiation safety principles for handling radioactive material in a safe and appropriate manner
  - d. have attended Site Radioisotope User Orientation and registered for the Basic Radiation Protection Seminar
  - e. all associate users have had appropriate training
  - f. maximum amount of activity per experiment and maximum amount stored in a lab at any one time
  
- The criteria for approving the associated facilities include:
  - a. appropriate shielding, if necessary
  - b. appropriate portable survey meters
  - c. personnel dosimetry has been issued to users, if necessary
  - d. work areas are clearly designated and labeled
  - e. spill control equipment appropriate for the experiments, e.g., absorbent paper, drip trays, secondary containment
  - f. licensed material above the exempt level will be secured when in storage
  - g. equipment used with radioactive materials is labeled
  - h. engineered controls are appropriate, e.g., chemical fume hood, biosafety cabinets
  
- Review reports of above-action-level incidents and/or infractions of any rules or regulations and recommend actions or develop policies to ensure a safe workplace. Administrative actions available to the Committee include, but are not limited to, user loss of privileges, additional training, direct supervision of an experienced user, RSO audit of lab operations, management notification.
  
- Develop procedures and criteria for training and checking the effectiveness of this training for each category of worker.
  
- Review and approve new Committee members nominated by Management. NRC approval will be obtained for the Committee Chairperson and the RSO of record. A list will be maintained of current Committee members and their appropriate training and experience.
  
- Use existing Program Audit process to assess compliance and evaluate performance of the user community and the Radiation Safety Office

## RADIATION SAFETY OFFICER (RSO)

The Radiation Safety Officer (RSO) of record is Mr. Norman Henry. Mr. Henry has served as RSO of record since 1993. Attached, (Attachment 2, page 50), is a summary of Mr. Henry's training and experience in the safe use and management of radioactive materials.

Augusto Cordova, RSO of record at the DuPont Experimental Station, Jeremiah L. Driscoll, former RSO of record at the DuPont Glasgow Business Center, and Mike Ohm, Assistant RSO at the Stine-Haskell Research Center, serve as backup RSOs.

### **Duties of the RSO**

The RSO shall have the authority to stop work involving radioisotopes where conditions of the license and/or safety standards are not met.

Duties and responsibilities of the RSO (or his/her designate) shall include:

1. Conducting required personnel monitoring and contamination surveys and maintaining all records of these activities. Licensed subcontractors may also conduct surveys.
2. Oversight of ordering, receipt, survey and delivery of arriving licensed material, as specified in 10 CFR 20.1906 and 49 CFR 173
3. Ensuring the proper packaging, labeling, surveys, etc. of radioactive materials leaving the institution.
4. Personnel monitoring program, including the need for and evaluating bioassays, monitoring personnel exposure records, and developing corrective actions for those exposures approaching maximum permissible limits.
5. Training personnel.
6. Supervising disposal or transfer of all radioactive waste, and maintenance of disposal records.
7. Inventory and leak tests of sealed sources.
8. Decontamination
9. Investigating any incidents and responding to any emergencies
10. Maintaining an inventory of all radioactive material.
11. Perform audits of all areas of use and individuals who are authorized to use byproduct material.
12. Maintaining all required records
13. Responding to information requests concerning radiation safety.
14. Serving on the Radiation Safety Committee

## **Item No. 8: Training for Individuals Working in or Frequenting Restrictions Areas**

### **Initial Site-Specific Training - Unsealed Use**

All users of unsealed radioisotopes must attend the Site-Specific "Radiation Safety Orientation" session covering the safe use of radioisotopes. Items covered include:

- Procurement and receipt of radioisotopes
- Hazards and handling precautions for individual radioisotopes
- Employee rights and responsibilities under 10 CFR, Parts 19 and 20
- Locations of pertinent regulations, and licenses
- Material storage and security
- Locations where radioactive material is used and stored
- Radiation Safety Procedures
- Individuals obligation to report unsafe conditions to the RSO
- Applicable exposure limits
- ALARA Policy
- Radiation monitoring (badges)
- Bioassay requirements
- Worker's right to be informed of occupational radiation exposure
- Waste disposal procedures
- Spill clean-up and notification procedures
- Signs and labeling
- Audits, surveys and wipe tests of laboratories

### **Radiation Protection Seminar**

A lecture course, "Radiation Protection Seminar," is given which discusses basic radiation protection in accordance with 10 CFR 19.12. Items such as radioactive decay, biological effects, principles of protection (e.g., time, distance and shielding), and monitoring are covered.

All new users of unsealed radioactive material after 8/1/88 are required to attend the Seminar. Sealed source users are required to attend the Seminar if their device is not eligible to be purchased and used under a general license. The Radiation Safety Office maintains records of this training.

The Radiation Protection Seminar includes the following topics:

- Physics of ionizing radiation
- Modes of radioactive decay
- Sources of ionizing radiation
- Types and categories of radioactive material
- Specific decay schemes

- Kinetics of decay
- Units of activity
- Specific activity
- Interactions with matter
- Unit of exposure and dose
- Biological effects
  - a. Physical-chemical processes
  - b. Tissue and organ effects
  - c. Radiation syndrome
  - d. Chronic effects
  - e. Cancer statistics
- Background radiation, including radon
- Permissible exposure standards (10 CFR 20)
- ALARA Principle
- Radioisotope deposition in the body
- Permissible concentrations and ALI
- Protection through:
  - a. Time
  - b. Distance
  - c. Shielding
  - d. Containment
- Personal protective equipment
- Personal monitoring
- Survey equipment
- Hazard postings
- Protective rules for radioisotope work
- Audits and inspections

### **Initial Site-Specific Sealed Source Training**

All users of sealed sources must attend the Site-Specific "Sealed Source Orientation" session covering the safe use of sealed sources. Items covered include:

- Procurement and receipt of sealed sources
- Hazards and handling precautions for individual sources
- Employee rights and responsibilities under 10 CFR, Parts 19 and 20
- Locations of pertinent regulations, and licenses
- Material storage and security
- Locations where sealed sources are used and stored
- Radiation Safety Procedures
- Individuals obligation to report unsafe conditions to the RSO
- Applicable exposure limits
- ALARA Policy
- Radiation monitoring (badges)

- Worker's right to be informed of occupational radiation exposure
- Transfer, redeployment and disposal procedures
- Exposure incident response
- Signs and labeling
- Audits and leak tests

### **Refresher Training**

In addition, all groups in which radioisotopes are used shall receive periodic documented refresher training on radiation safety rules and practices at least every two years. Refresher training may be provided more frequently based on program or regulatory changes.

### **ANCILLARY EMPLOYEE TRAINING (NON-USER)**

Employees not handling radioactive materials but exposed or potentially exposed to radiation (such as, janitorial, maintenance, clerical, administrative and technical personnel) will receive initial documented training appropriate to the assignment and exposure potential.

All these personnel are familiarized with the radioisotope symbol and furthermore are told not to touch anything in the labs that they have no reason to, especially containers or equipment displaying the radioisotope symbol. These instructions are given to them in their orientations when hired.

### **SPECIAL ADDITIONAL TRAINING**

Principle Investigators are required to submit a background information form to ensure they have sufficient training and experience to meet their responsibility for radioisotopes ordered, used and disposed under their direction. The Radiation Safety Committee reviews the form and may, at its discretion, require additional training or guidance by another experienced user. Principal investigators must have a minimum of a college degree at the bachelor's level or equivalent training and experience in physical or biological sciences or in engineering and 40 hours of additional training and experience related to radioactive materials.

Research management, in assigning research projects and lab facilities, approves the qualifications and technical competence of professionals using or working in the vicinity of radioisotopes.

## **Assessment of Comprehension**

An assessment of comprehension and abilities of radiation and ancillary workers will be conducted during the annual management audit of lab areas. The audit team will conduct random interviews with radiation workers and support staff. The RSO or Radiation Safety Committee will address any issues raised during this or other audits.

The Radiation Safety Committee may use input from the annual management audits, the RSO, radiation workers and support personnel to evaluate training program effectiveness. An existing program may be modified or replaced when the Committee determines that the change proposed will provide the same or better protection than the existing program. The determination may rely on interviews, observation or testing of a test group.

## **Additional Forms of Communication with Radiation Workers**

In addition to the refresher training for various groups of employees, our electronic mail is an effective tool for quickly disseminating information. All employees are tied into the electronic mail system or have access to the corresponding information on paper. Using specific distribution lists, various groups can be targeted. The Radiation Safety Committee uses this method to reinforce certain aspects of the radiation safety program, to let others know of incidents, or to pass along information on regulatory or program changes.

## **Training Records**

Training records will include a course outline, the duration of the course, instructor name(s), date and list of participants. The Radiation Safety Officer or other qualified personnel will provide the training. Reputable instructors knowledgeable in their area of expertise may be brought on site to perform some training. In some instances participants will be sent to various offsite training courses offered by reputable instructors. The Radiation Safety Officer will determine if the instructors and courses of off-site training are appropriate.

## **Item No. 9: Facilities and Equipment**

### **FACILITIES**

The DuPont Stine-Haskell Research Center is located on Route 2, (1090 Elkton Road) in Newark, Delaware. The combined facility has over 800 employees located in over 30 buildings. A fence surrounds the 535-acres and access through the gates is controlled on a 24-hour basis by electronic card access and/or security force.

[Field studies at Stine Farm, 1090 Elkton Rd, Newark, DE 19711, will occur only through NRC license # 07-13441-02, Reference Number 030-20681, assigned to the DuPont Stine-Haskell Research Center.]

The Glasgow Site Building 300 is located in Glasgow, Delaware, approximately 5 miles south on Rt. 896 from the Stine-Haskell Research Center in Newark, Delaware. The building is owned and operated by the DuPont Company. There are approximately 10 radioisotope users engaged in research and development activities similar to those on our site. The site and building are secured by a card access system.

The Delaware Technology Park (DTP) facility is located in Newark, Delaware, and leased by the DuPont Company. This facility houses a general molecular biology laboratory using current techniques to label DNA, detect specific genetic sequences and to discover genes and their function. There are approximately 20 users of isotopes and about 5 laboratories designed for this research. It is secured by a card access system.

The DuPont Pharmaceuticals Company, a wholly owned subsidiary of DuPont, also operates within the Stine-Haskell Research Center and uses and stores byproduct material under a separate NRC license, # 07-00455-40. Of the approximately 30 buildings at the Stine-Haskell Research Center, the DuPont Pharmaceutical Company uses unsealed byproduct material in the following buildings: S110, S112, S115, S320, H1, and H14. Bristol-Myers Squibb Company intends purchasing the DuPont Pharmaceutical Company from DuPont. Under this agreement, Bristol-Myers Squibb will lease space at the Stine-Haskell Research Center and make use of the services provided by DuPont to its resident Business Units.

The Radiation Safety Office will maintain a listing of the areas operating under the restricted area definition of 10 CFR 20.1003. The facility may expand or reduce the scope of these areas as long as the change is consistent with one of the criteria described below.

- Criteria used to demonstrate the entire site is contained within a restricted area as defined in 10 CFR 20.1003:

- a. Personnel provided a pass to enter the site unescorted are informed of the potential hazards from radioactive materials and how to recognize and avoid unreasonable radiation exposure potential. Information will be provided initially. Visitors may also be protected from the potential hazards through use of an escort or by remaining with a vehicle while on site.
- Criteria used to demonstrate an entire building is contained within a restricted area as defined in 10 CFR 20.1003:
  - a. Personnel provided a pass to enter the building unescorted are informed of the potential hazards from radioactive materials and how to recognize and avoid unreasonable radiation exposure potential. Information will be provided initially. Visitors may also be protected from the potential hazards through use of an escort.
- Criteria used to demonstrate a room serves as a restricted area as defined in 10 CFR 20.1003:
  - a. Personnel provided a pass to enter the room unescorted are informed of the potential hazards from radioactive materials and how to recognize and avoid unreasonable radiation exposure potential. Information will be provided initially. Visitors may also be protected from the potential hazards through use of an escort.
- Outside a 10 CFR 20.1003 restricted area, licensed material will be:
  - a. Secured when in storage.
  - b. Attended or secured while in use.
  - c. Confined to rooms posted with the standard radioactive material caution signs as well as a "Authorized Personnel Only" sign.

## LABORATORIES

Most of the radiotracer work is at low activity and is carried out in standard laboratories equipped with a chemical fume hood or a biological safety cabinet.

### **Area Classification**

The Radiation Safety Committee's ALARA program uses radioisotopes and total inventory to classify labs containing unsealed material.

- ALARA Category 1 labs - limited to exempt quantities (10 CFR 30.18) provided in Part 30 Schedule B; 10 CFR 20 Appendix C is used for P-33.

- ALARA Category 2 labs - limited to 40 X the Annual Limit of Intake (ALI as defined in 10 CFR 20 Appendix B). The Sum of the Ratios Rule applies where more than one radioisotope is used. Keeping a room's inventory below 40 ALI makes an internal exposure above 1% ALI very unlikely.

Radiation Safety Committee may grant possession levels above 40 ALI to ALARA Category 2 labs. The researcher must provide an evaluation of the contamination and exposure potential and the engineering and administrative controls developed to prevent an intake above 1% ALI (corresponding to 50 mR/year).

Some factors considered by the Radiation Safety Committee:

1. Engineering controls installed
  2. Type of material stored and handled
  3. Radioisotope
  4. Manipulation conducted
  5. Activity per manipulation
  6. Number of manipulations per day or week
  7. Personnel protective equipment used
  8. Contamination control and detection practices in place
- ALARA Category 3 labs - The researcher must provide the Radiation Safety Committee an evaluation of the contamination and exposure potential and the engineering and administrative controls developed to prevent an intake above 10% ALI (corresponding to 500 mR/year).

### **Eating and Smoking Areas**

Eating and smoking is allowed when radioactive materials are in special form, i.e., sealed sources. Radiation Safety Committee review is required for labs using or storing unsealed radioactive material. Review involves the approval signature from one member of the Radiation Safety Committee. RSO signature will be used to confirm:

1. Unsealed radioactive materials in use or storage are limited to exempt quantities as defined by 10 CFR 30 Schedule B, or 10 CFR 20 Appendix C values for radionuclides not listed in 10 CFR 30 Schedule B.
2. Eating and smoking areas are distinct, clearly defined, marked with yellow tape and labeled "Food - No Chemicals".
3. Unsealed radioactive materials, as well as other chemicals, will not be stored or handled in these designated areas.
4. Gloves for radioactive material handling must be removed before entering and/or touching anything within in the designated "Food - No Chemicals" area.

5. Labs wishing to establish eating/smoking areas provide initial wipe test results to the Radiation Safety Office.

### **Special Use Facilities**

A hot-C laboratory (S120) will be used to store radiolabeled materials for distribution to P.I.'s on site.

Prior to authorizing a laboratory for labeling by tritium gas, the Radiation Safety Committee evaluates engineering controls in place for containment of radioactivity and effluent release to restricted and unrestricted areas, per 10 CFR 20 Appendix B values.

Prior to authorizing a facility involving loose material generating alpha particles, the Radiation Safety Committee evaluates engineering and administrative controls for preventing and controlling contamination.

### **Laboratory Animal**

Laboratory animals exposed to radioisotopes are kept separate from those not exposed. All liquid and solid waste is monitored for the presence of radioactivity and, as appropriate, collected and disposed of as radioactive waste. At the end of the experiment, all bedding is removed, the area is cleaned and wipe tested for contamination. Animals in which radioactive materials are used are under the direct control of the principal investigator. All individuals working with the animals, wastes or carcasses contaminated with radioactivity are required to participate in appropriate orientation/training courses.

Experimental animals administered radioactive materials will not be used for human consumption.

### **Storage Areas**

Storage areas are provided for radioisotopes not in active use, for unused portions of radioactive materials, and for wastes that are retained for decay before disposal or for which special disposal arrangements must be made. Storage areas or the containers are secured when unattended.

Facilities holding radioactive waste for decay-in-storage (H-11) are reviewed for the following:

- a. physical access of area limited to authorized personnel
- b. provisions for secondary containment of liquid waste
- c. container protection from the elements
- d. segregation and placement of the waste for ready identification and auditing of waste prior to disposal
- e. fire protection through the use of one or more of the following: non-combustible material of construction, fire suppression equipment such as automatic sprinklers, fire detection and alarm system
- f. ambient radiation levels kept below 2 millirems/hr through administrative controls (activity limits), distance considerations, and/or appropriate shielding

## **Item No. 10: Radiation Safety Program**

### PROGRAM AUDITS

A program review is conducted annually by the Radiation Safety Committee. This review is structured to assess compliance with the terms and conditions of the license, and examines the administration and organization of the Radiation Safety Program. This review provides an evaluation of the performance of the RSO and radiation safety staff.

Annually the Radiation Safety Committee conducts interactive laboratory audits. These audits are structured to assess compliance and the development needs of material users. The audit teams include an RSO and a management representative of the user community. Results of the audit are shared with the management of the user community.

Semiannually the RSO and staff conduct announced or unannounced audits of areas that use radioactive materials. The annual Radiation Safety Committee audit attended by the RSO may be used as one of those audits.

Labs handling unsealed radioactive material conduct self-audits at least quarterly. A self-audit checklist is completed and action items are identified.

### INSTRUMENTS

#### **Selection Criteria**

Radiation monitoring instrumentation selection is based on the radioisotope used, the quantities handled and the minimum detection levels at issue. The table below summarizes some information used in selecting the appropriate instrument.

TABLE 10-1 INSTRUMENT CRITERIA

<b>Surface Contamination and/or Qualitative Exposure Rate</b>			
<b>Radioisotope</b>	<b>Radiation</b>	<b>Probe &amp; Survey Efficiency</b>	<b>Issue</b>
C-14, P-33, S-35	Medium energy beta	Pancake G-M Probe: ~5% C-14 or S-35; ~20% P-33	Contamination
P-32	High energy beta	Pancake G-M Probe: ~35% efficiency	Contamination, external exposure
I-125	Low energy x-ray	Thin NaI Scintillation Probe: ~35% efficiency; Pancake G-M Probe: ~0.5% efficiency	Contamination, external exposure
Cs-137	Medium energy gamma rays	Pancake G-M Probe: ~3,300 cpm/mR/hour	External exposure

TABLE 10-2 LIQUID SCINTILLATION COUNTER CRITERIA

<b>Liquid Scintillation Counter</b>			
<b>Detector</b>	<b>Radiation</b>	<b>Efficiency</b>	<b>Issue</b>
H-3, C-14, P-32, P-33	beta	Setting, energy and quench dependent. Standards used. Typical counting efficiencies: H-3: 50%; C-14, S-35, P-33: 85%; P-32: 95%	Removable contamination
I-125	x-ray	Setting, energy and quench dependent. Standards used. Typical counting efficiencies: I-125: 65%	Removable contamination

### Instrument Calibration

Radiation survey meters such as Geiger-Mueller ratemeters and ionization chamber exposure rate meters used by the Radiation Safety Officer or designate will be calibrated annually. Vendors or persons authorized by the NRC or Agreement States to calibrate survey meters, e.g., Applied Health Physics, Inc. (NRC License No. 37-09-135-01), or the University of Delaware (NRC License No. 07-01579-19) will calibrate them. Meters without a current calibration sticker will not be used.

Geiger-Mueller type survey meters used to identify contamination in labs will be checked periodically for operability and ability to detect low level contamination, rather than receiving full calibration. The lab occupant checks such survey meters quarterly or prior to use. Stickers will be used to indicate the date of the last full calibration.

Quarterly operational checks are documented on the Self-Audit Checklist completed and retained by each lab using or storing unsealed radioactive materials. Survey meter checks and calibration stickers reviewed during annual Radiation Safety Committee audits.

The thyroid monitoring system contains a scalar ratemeter equipped with a scintillation probe. It will be calibrated with a NBS traceable iodine-129 standard when iodine-125 is used and a NBS traceable barium-133 if iodine-131 is used.

Liquid scintillation counters are serviced and calibrated by the vendor. Internal standards are used to test the counting efficiency for hydrogen-3 and carbon-14 urine samples.

## MATERIAL RECEIPT AND ACCOUNTABILITY

### **Control of Procurement and Use of Byproduct Material**

During normal working hours, radioactive packages are delivered to Site Receiving, S102, attention Radiation Safety Office. During off-duty hours, Site Security accepts delivery of radioactive packages and places them in the designated secured storage area. The RSO is contacted immediately and the carrier asked to remain when a package appears damaged.

Trained receiving personnel deliver the package after the following steps:

- Package does not appear damaged or contaminated
- Packages placarded as DOT White I, Yellow II or Yellow III are wipe tested

The RSO approves requests for radioactive material to enter or leave the facility. This process ensures requested materials, quantities, manufacturer and model are authorized by the license and that possession limits are not exceeded.

Researchers wishing to use licensed material must receive initial training in procurement, safety and waste disposal procedures. The Radiation Safety Office maintains records of this initial training. Procurement, control and disposal requirements are part of the refresher training provided at least biennially.

Before an order is placed for radioactive material, purchase orders and radioisotope request forms are routed to the RSO. The approval of the Radiation Safety Committee is obtained, if required.

## **Material Control, Accounting and Security**

An inventory of all radioisotopes received shall be kept by the RSO and updated quarterly. In addition, inventory sheets are sent to users periodically for updating. The updated inventory sheets are used to further refine the inventory records. All transfer of radioisotopes within the facility must be to approved users only.

Transfer of radioactive material requires the approval of the RSO or designate when radioactive material is transferred to a location not covered under this license.

The following conditions from our existing license are retained:

1. Allow use and transfer of soil, plant and animal tissues with radioactivity of less than the DOT radioactive material definition of 4400 dpm/gram and less than one tenth the NRC exempt quantity limit for the specific radionuclide, e.g., 10 microcuries for carbon-14, without approval of an RSO.

Users document shipment dates, quantities and concentrations. The process of updating periodic radioisotope inventory and the radioactive waste disposal procedure apply to owners of such material. Any lab where the quantities of material in possession exceed one tenth of the NRC exempt quantity shall be considered a radioisotope lab subject to all conditions of the license, e.g., posting, wipe-testing, authorized users, etc.

2. Allow use and transfer of material containing less than the DOT radioactive material definition of 4400 dpm/gm, the NRC source material concentration definition (0.05% or 500 ppm) and one tenth of the NRC exempt limit for natural uranium or thorium (10 microcuries), without approval of an RSO.

## OCCUPATIONAL DOSE

### **External Exposure**

Whole body badges are worn by all persons who might receive an external radiation dose in any calendar year in excess of 10% of applicable limits of whole body radiation specified in 10 CFR 20.1201. All individuals who might receive a dose to the extremities in excess of 10% of the standard specified in 10 CFR 20.1201 for hands, forearms, feet and ankles, wear extremity badges. In general, dosimetry is issued when there is any question that a person could approach the annual dose requiring dosimetry.

DuPont will provide film, TLD or OSL (optically stimulated luminescence) badges through a supplier of external dosimetry services that is NVLAP certified in beta and gamma dosimetry and is licensed by the NRC or an Agreement State to provide this service. The minimum exchange frequency is monthly for film, and quarterly for TLD and OSL.

The current dosimeter supplier is Landauer Inc., Technical Department, 2 Science Rd, Glenwood, IL 60425-1586.

The threshold for evaluating the need for dosimetry is P-32 use in excess of 1 millicurie, or I-125 use in excess of 100 microcurie. Other radioisotopes will be evaluated by the Radiation Safety Committee, on a case by case basis, taking into account the quantities of material in use, energy of the radioisotope, shielding, distance and time of exposure.

### **Internal Exposure**

1. Urine samples will be collected for all persons working with more than 40 ALI (Annual Limit Intake, 10 CFR 20 Appendix B) per day or 200 ALI per week if experiments are conducted every seven days or less often. Samples will be counted in a scintillation counter and results communicated to the employee.

Bioassays for tritium will be conducted in accordance with the guidance in ANSU Standard HPS N13.14-1994, "Internal Dosimetry Programs for Tritium Exposure - Minimum Requirements." Approved as an American National Standard on April 13, 1994. Superceding Standards and other bioassay programs accepted by the NRC may also be used.

2. Thyroid measurements for all personnel who work with volatile radioactive iodine in excess of 100 uCi will be made. A low energy gamma scintillation probe system will be used for the thyroid measurements.

When the thyroid burden measurement exceeds 0.12 uCi of I-125 or 0.04 uCi of I-131 or when the average urinary tritium concentration exceeds 5 uCi/l an investigation will be carried out. It will determine the cause(s) of exposure and any reasonable corrective action will be taken to lower the potential for future exposure. Further work status of employees will be restricted if the thyroid burden exceeds 0.5 uCi of I-125 or 0.14 uCi of I-131 and if the urinary tritium meets or exceeds 50 uCi/l.

A body burden of 0.02 ALI will be the investigational level for other radioisotopes.

## **Air Monitoring**

Air monitoring will be conducted by the Radiation Safety Officer or designate whenever volatile iodine may be created during a labeling experiment involving I-125 and:

- a. the iodination is by a new user
- b. a new procedure is used that involves more than 100  $\mu\text{Ci}$ , or
- c. a procedure involves greater than 1 mCi.

Results will be compared with the requirements of 10 CFR 20.1302, for compliance.

Air monitoring will be conducted during tritium labeling experiments involving more than 40 ALI per day  $[(10\text{E}+4 \text{ ALI}) \div 250 \text{ days}]$ , or 200 ALI per week if experiments are conducted every seven days or less frequent. Results will be compared with the requirements of 10 CFR 20.1302.

## **SAFE USE OF RADIONUCLIDES AND EMERGENCY PROCEDURES**

### **General Rules Applicable to Licensed Material not in Sealed Form**

The Radiation Safety Committee established the following rules for the use and storage of radioactive materials not in sealed form. As part of its ALARA program the RSC may update the rules after obtaining input from the RSO, the research community and findings from audits or incident investigations.

1. Non-permeable gloves shall be worn when handling radioisotopes. Other personal protection, such as laboratory coats, aprons, safety glasses with side shields, etc. may also be needed, as required by specific work procedures. Laboratory coats shall be worn when using amounts in excess of 1 mCi (10 mCi for H-3; 0.1 mCi for P-32 and I-125). Avoid wearing lab coats outside lab areas. Disposable Tyvek® laboratory coats are recommended to reduce potential contamination.
2. Hands should be washed frequently, especially before eating or smoking, and at the end of each work period.
3. Do not use personal non-disposable items such as pocketknives, handkerchiefs, etc., in connection with radioisotope work.
4. Where operations involving radioactive material have a spill potential, place equipment containing radioactive material in trays lined with plastic or absorbent paper and labeled with the radiation symbol. Low-level analytical and biological operations are exempted.

5. Where appropriate, run reactions in a fume hood with a face velocity between 60 and 80 linear feet per minute. The hood must be labeled with the radioactive material sign. Biosafety cabinets venting internally are not appropriate for radioisotope work.
6. Eating, drinking and smoking are prohibited in labs where unsealed radioisotopes are used or stored, unless specifically authorized by the Radiation Safety Committee.
7. An inventory of radioisotopes on hand is part of the record keeping required by the NRC. On a quarterly basis Principal Investigators (P.I.) will be sent an inventory sheet listing the isotopes in their possession. It is the responsibility of the Principal Investigator to promptly update and return the "Inventory Verification Form" to the Radiation Safety Office.
8. At the area entrances post the "Maximum Expected Quantity" (MEQ) of each radioisotope used or stored.
9. Every ALARA Category 1 lab that used radioactivity during the quarter must conduct a quarterly contamination survey and complete the self-audit checklist. Every ALARA Category 2 or 3 lab that used radioactivity during the prior month must conduct a monthly contamination survey. The contamination survey includes a self-audit checklist. Notation, date and signature accepted in lieu of wipe test if unsealed material not used. If more than 0.2 mCi (2 mCi for H-3) is used at any one time, weekly contamination surveys are required. Lab users will keep records of their surveys and self-audits. If the removable contamination exceeds 200 dpm/100 cm<sup>2</sup>, decontaminate the area. If the removable contamination exceeds 2,200 dpm/100 cm<sup>2</sup>, contact the Radiation Safety Officer who will direct decontamination and record the incident.
10. Every two years users and Principal Investigators of radioisotopes shall attend radiation safety training that includes a review of program requirements. Non-users in the area will receive initial radiation safety awareness level training. Training documentation shall be maintained by the Business Unit or RSO.
11. When leaving or transferred to another location users must complete an exist checklist. Submit a copy to the Radiation Safety Office. All radioactive materials possessed or in transit must be transferred to a listed Principal Investigator or disposed by permitted methods.
12. Documentation of the lack of radioactive contamination is required to release for general use equipment or areas that used unsealed radioactive materials. This is accomplished through the Decommissioning Checklist available from the Radiation Safety Office.

13. Dispose of radioactive waste only in designated, labeled and properly shielded receptacles.

14. Confine radioactive solutions in clearly labeled containers.

15. Protect house services (vacuum, ventilation, etc.) from potential contamination.

Evaluate need for filtering, trapping, or dedicated systems. As a minimum use double traps and an in-line filter before the house vacuum when aspirating liquids containing radioactive materials.

Include tubing or vacuum nozzle on wipe test to document vacuum system is free of contamination; alternatively, use a separate vacuum pump.

16. Radioactive materials used outside an "NRC restricted area" will be:

- secured when in storage. Waste is considered in storage at the end of the day's accumulation, irrespective of the operations planned for the next day.
- attended or secured at all times while in use. Waste being accumulated during the day, prior to storage, falls under the definition of "material in use".
- confined to rooms posted with "Authorized Personnel Only" sign, in addition to the standard radioisotope lab signs.

17. Prior to conducting preparative chemical reactions with radioactive materials, trial runs with non-radioactive material shall be made to check techniques and equipment.

18. No mouth pipetting.

**TABLE 10-3 EXPECTED USE CRITERIA  
By Radioisotope and Quantity**

<u>Radionuclide</u>	<u>Shielding</u>	<u>* Lab Coat</u>	<u>Dosimetry Badge</u>	<u>Survey Meter During Use</u>	<u>Air Monitoring or Bioassay</u>	<u># Work Area Secondary Containment</u>	<u>+ End of Week Wipe Test</u>
C-14	N/A	1 mCi	N/A	N/A	10 mCi	10 mCi	0.2 mCi
H-3	N/A	10 mCi	N/A	N/A	100 mCi	100 mCi	2 mCi
P-32	0.1 mCi	0.1 mCi	1 mCi	1 mCi	10 mCi	10 mCi	0.2 mCi
P-33	N/A	1 mCi	N/A	N/A	10 mCi	10 mCi	0.2 mCi
S-35	N/A	1 mCi	N/A	N/A	10 mCi	10 mCi	0.2 mCi
I-125	0.01 mCi	0.1 mCi	0.1 mCi	0.1 mCi	1 mCi	1 mCi	0.2 mCi

\* Lab coats (Tyvek®) recommended but not required when handling smaller quantities.  
Note: Disposable gloves required with any quantity of unsealed material.

# Tray or equivalent required when these quantities are handled.  
Note: Plastic-backed absorbent paper required with any quantity of unsealed material.

+ Monthly wipe tests required for any quantity of unsealed material used in ALARA Category 2 or 3 lab. A monthly notation, date and signature accepted if unsealed material not used within the last month. Quarterly wipe test required for any quantity of unsealed material used in ALARA Category 1 lab.  
After using radioactive material a sweep with a survey meter is recommended of the work area, adjacent floor, door handle, lab coat and bottom of the shoes. A pancake-G-M probe is appropriate for C-14, S-35, P-32 and P-33; a scintillation probe is appropriate for I-125.

@ Self-audit checklist completed even when radioactive materials are not used or stored in the room; quarterly for ALARA Category 1 labs and monthly for ALARA Category 2 or 3 labs.

## **General Rules Applicable to Licensed Material as a Sealed Source**

1. The Principal Investigator/Custodian of a sealed source is responsible for notifying the RSO of any proposed changes in the location or status of a sealed source. The Radiation Safety Office must be contacted before making arrangements to relocate or transfer ownership of a sealed source.
2. A label must be attached to the source holder, stating the type and quantity of radioactive material and the date of manufacture. The label must bear the conventional radiation symbol. In addition, the area needs to be posted. The drawer or other container where a sealed source may be stored shall also be labeled.
3. Radioactive materials used as sealed sources must be in sealed containers of a design approved by the NRC or an Agreement State.
4. Adequate shielding must be provided at all locations where radiation sources are used or stored. Make sure the radiation intensity at all points accessible to personnel is within limits specified in 10 CFR 20.1201 and 10 CFR 20.1301. Contact the RSO if radiation levels could approach 2 millirems/hour. Keep exposures ALARA.
5. All operations involving transfer of sealed sources for nuclear gauges must be performed under the direct supervision of the RSO or approved alternate. During transfer of these sources between locations, remote handling apparatus and special shielding containers must be employed to ensure that exposure to personnel working with the material is kept to a minimum. All personnel not directly required for such transfer must be cleared from the area and the restricted area requirements implemented.
6. A Process Hazards Review and Radiation Safety Committee approval are required when personnel are likely to receive a dose in excess of 20 millirems/week or enter a radiation field greater than 2 millirems/hr.
7. Each area in which radioactive sources are used or stored must be conspicuously posted with the radioisotope sign and the appropriate wording given in 10 CFR 20.1901. Contact the Radiation Safety Office for the necessary signs.
8. Each area in which radioactive sources are used or stored must be periodically surveyed to ensure that no dangerous levels of radiation exist and radiation exposure is As Low As Reasonably Achievable (ALARA).

9. To minimize damage to sources in case of fire, each installed source must be in an area protected by automatic sprinklers. Exceptions must be approved by the RSO, who will consult with the Fire Chief.
10. The source owner must annually complete an annual Self-Audit Checklist for each sealed source so that the source owner maintains compliance and awareness. The form shall be retained three years by the source custodian.

### **Millicurie Quantities of Phosphorous-32**

The following special safety instructions will be provided to individuals using millicurie quantities of phosphorous-32:

- a. Take special precautions when handling quantities of P-32 in excess of 1 mCi; prevent ingestion and excessive exposure of skin or eyes to the strong beta-radiation. Keep exposure as low as reasonably achievable (ALARA).
- b. Every reasonable attempt shall be made to prevent unnecessary exposure. Use suitable plastic shielding that absorb beta particles and prevent generation of secondary x-rays.
- c. A "dry run" shall be required before performance of an unfamiliar procedure using millicurie quantities of P-32.
- d. A portable monitor with a thin window GM probe shall be used to survey work areas during and at the conclusion of each procedure.
- e. All portable equipment must be monitored with a GM counter for contamination before being removed from the controlled area.
- f. Shoes, lab coats and hands must be monitored before leaving the area.
- g. Wipe tests will be performed and documented at the completion of the experiment.
- h. Body and extremity (ring or wrist) badges shall be worn.
- i. Levels of radiation shall not exceed 0.75 mR/hr. on the average except for brief periods during experiments when exposure to users shall be kept ALARA and below 100 mrem/week.
- j. All rules in the Radiation Safety Procedure shall also apply.

## EMERGENCY PROCEDURES

### Incident Response Principles

In the Event of a Radiation Incident the RSO or designate will take appropriate action in one or more of the following ways:

- Investigate and document the degree and cause of contamination and/or exposure.
- Post and isolate the contaminated area and/or equipment.
- Evaluate the degree of exposure (internal and external) and/or contamination.
- Suspend operations in a laboratory area and/or suspend work of an individual.
- Schedule and supervise appropriate decontamination procedures.
- Require an Incident Investigation

**Minor Spills** - not exceeding the more stringent of 1 mCi and 10 x exempt quantities (10 CFR 20 Appendix C - Quantities Requiring Labeling)

- NOTIFY: Notify persons in the area that a spill has occurred.
- EVALUATE: Determine extent of spill, exposure potential and clean up capabilities. (If assistance required contact RSO through Site Emergency number.)
- PREVENT THE SPREAD: Cover the spill with absorbent material.
- CLEAN UP: (Use appropriate disposable gloves and remote handling tongs where applicable. Carefully fold the absorbent paper and pad. Insert into a plastic bag and dispose of in the radioactive waste container. Also insert into the plastic bag all other contaminated materials such as disposable gloves.
- SURVEY: Wipe test where applicable or with a low-range, thin-window G-M survey meter, check the area around the spill, hands, and clothing for contamination.
- REPORT: Report incident to line management and to the Radiation Safety Officer or designate.

**Major Spills** - exceeding the more stringent of 1 mCi and 10 x exempt quantities (10 CFR 20 Appendix C - Quantities Requiring Labeling)

- CLEAR THE AREA: Notify all persons not involved in the spill to vacate the room.
- PREVENT THE SPREAD: Cover the spill with absorbent material, but do not attempt to clean it up. Confine the movement of all personnel potentially contaminated to prevent the spread.

- **SHIELD THE SOURCE:** If possible, the spill should be shielded, but only if it can be done without further contamination or significant radiation exposure.
- **ISOLATE THE AREA:** Barricade the area and restrict access.
- **REPORT:** Use Site Emergency Number and request immediate Radiation Safety Officer response. The Response Team will be contacted, if appropriate.
- **PERSONNEL DECONTAMINATION:** Contaminated clothing should be removed and stored for further evaluation by the Radiation Safety Officer. If the spill is on the skin, flush thoroughly and then wash with mild soap and lukewarm water.
- **INVESTIGATE:** Convene an Incident Investigation.

### **Survey of Areas Handling Unsealed Material**

Laboratories where radioisotope work is conducted are wipe-tested two times per year by the RSO or designate. Individual users are required to perform wipe tests or monitoring at least quarterly, per Table 10-3 Expected Use Criteria.

Corrective Action level for decontamination shall be 200 dpm/100cm<sup>2</sup>. The action level for wipe test results requiring immediate contact of a Radiation Safety Officer and incident documentation is 2,200 dpm/100cm<sup>2</sup> (equivalent to 0.005 microcurie, the action level used with sealed source leak tests.). Incidents below the 2,200 dpm/100cm<sup>2</sup> action level would be documented in the monthly wipe test records kept in the labs by radioisotope users.

### **Sealed Sources**

A leak test is conducted every six months, unless:

1. the source contains 100 uCi or less of beta and/or gamma emitting material, or 10 uCi or less of alpha emitting material
2. the source material consists entirely of a gas, contains only tritium or has a physical half life under 30 days

3. the source is generally licensed by the vendor and a longer leak test interval is specified
4. The source or detector cell is in storage. When the source or detector cell is removed from storage for use or transfer to another person, it shall be tested if a leak has not been conducted within 6 months.

We will implement the model leak test program published in Appendix T of NUREG-1556, Volume 11, "Program-Specific Guidance about Licenses of Broad Scope." Alternately, persons specifically licensed by the Commission or an Agreement State to perform such services will perform the tests.

Sealed sources not requiring leak testing will be physically inventoried every 6 months.

## **Item No. 11: Waste Management**

### DISPOSAL BY INCINERATION

Waste that may be incinerated will be shipped to facilities licensed to handle those materials, such as the DuPont Experimental Station or contract commercial facilities.

Radioisotopes will be packaged in compliance with NRC and DOT requirements.

Records of shipment will be kept by the Radiation Safety Officer.

## **Item No. 11.2: Land Disposal of Radioactive Isotopes**

Land disposal of radioisotopes is through a broker and in compliance with 10 CFR 20.2006. Transfer of material to the containers will be done by the Radiation Safety Officer or designate. The person handling the waste will wear, as a minimum, disposable gloves and lab coat or equivalent. The transfer of material will be done in such a manner as to ensure no skin contact. A personal monitoring device will be worn if needed and an appropriate survey meter will be present.

Radioisotopes will be packaged in compliance with NRC, DOT and the broker's instructions. We will use the current procedures supplied by the broker.

Records of shipments will be kept by the Radiation Safety Officer.

### **Item No. 11.3: Release Into the Air or Water**

Release into the air or water will be made in concentrations in conformance with 10 CFR 20.1302.

Disposal by release into the sanitary sewer will be made in accordance with 10 CFR 20.2003.

Discharge of licensed material into the sanitary sewer will be limited to readily soluble (or readily dispersible biological material). Records will be maintained of all disposals made into the sanitary sewage system. Prior release into the sanitary sewer, a Standard Operating Procedure will be developed to address the calculations and limitations specified in 10 CFR 20.2003(a)(2)(3)(4) and the records necessary to demonstrate compliance. If one of the methods described in NRC Information Notice 94-07 is not to be used to test representative sample of waste streams for sewer disposal, NRC Region I will be provided a description of the alternative methodology including appropriate models, calculations, analytical techniques and quality control measurements as well as the records that will be maintained.

All wastes are segregated and disposed of by or under the direct supervision of the Radiation Safety Officer or designate. Waste loads approaching the calculated quantity necessary to release the daily portion of the ALARA target (currently 10% of 10 CFR 20 Appendix B values for unrestricted release, air) will be investigated, and if practical, analyzed prior to incineration.

#### Item No. 11.4: Decay-In-Storage (H-11)

Radioactive waste with a physical half-life of less than or equal to 120 days will be held for decay-in-storage and then disposed in ordinary trash. See Site Radiation Safety Procedure (Item A of renewal application) for instructions provided to users on waste handling. All radioactive waste containers are labeled with information on the radioisotope, initial activity and date of packaging. Procedures for disposal by decay-in-storage are maintained by the Radiation Safety Office and are revised as necessary.

1. Verify survey meter equipped with an end window or "pancake" Geiger-Mueller probe, or other appropriate probe is operating correctly and has been calibrated within the last 6 months. On survey form, record name of person conducting survey, survey date, meter used and meter calibration date.
2. Set survey meter to its most sensitive setting. Establish background reading outside the storage facility. In millirem/hour, record background reading on survey form.
3. Review and record containers by radionuclide. Verify containers have been held at least 10 half lives, e.g., S-35: 874 days; P-32: 143 days, P-33: 250 days; I-125: 596 days; Cr-51: 277 days. Consult RSO or designate for physical half-life (up to 120 days) for radionuclides not listed. Record initial storage date, initial activity (uCi) and unique container ID on survey form.
4. With no interposed shielding and the survey meter set at its most sensitive setting, take readings of container surface. If readings are indistinguishable from background readings, record container survey readings on survey form. If readings are above background, identify and segregate waste container; contact Radiation Safety Officer or designate for resolution.
5. Remove or deface all radioactive material labels from container and waste tags/labels.
6. Provide unique container ID on both survey form and container.
7. Record summary waste information on survey form, e.g., waste type, chlorine or metals present, number of containers, as appropriate.
8. Submit survey form and copy to the RSO or designate. Records retention period: three years.

## **ITEM NO. 11.5: Disposal Without Regard to Residual Radioactivity**

Tritium and carbon-14 waste meeting the criteria listed in 10 CFR 20.2005 may be discarded without regard to its radioactivity.

Consistent with DuPont Experimental Station license amendment 62 (DuPont letter dated July 19, 1996), the following conditions are included in the licence application:

1. Allow use and transfer of soil, plant and animal tissues with radioactivity of less than the DOT radioactive material definition of 4400 dpm/gram and less than one tenth the NRC exempt quantity limit for the specific radionuclide, e.g., 10 microcuries for carbon-14, without approval of an RSO.

User would be required to document shipment dates, quantities and concentrations. The currently used, periodic radioisotope inventory update process and radioactive waste disposal procedure would apply to owners of such material. Any lab where the quantities of material in possession exceed one tenth of the NRC exempt quantity shall be considered a radioisotope lab subject to all conditions of the license, e.g., posting, monthly wipe-testing, authorized users, etc.

2. Allow use and transfer of material containing less than the DOT radioactive material definition of 4400 dpm/gm, the NRC source material concentration definition (0.05% or 500 ppm) and one tenth of the NRC exempt limit for natural uranium or thorium (10 microcuries), without approval of an RSO.

Users would be allowed to use material meeting the criteria above in general use labs (non-rad labs) and would not be subject to license conditions. Users would be required to review the toxicity and prudent practices appropriate for the given compounds in their possession, during their annual Hazard Communication (Right to Know) training. Waste meeting the criteria would be disposed without regard to radioactivity.

**Item No. 11.6: Interim Storage (S130)**

Radioactive waste generated on-site will be held for storage at the original location or another nearby DuPont location possessing a Type A license of broad scope: Experimental Station (license 07-0455-02).

The host license conditions will apply to the waste being stored there. After storage the waste may be returned to the originating location or handled according the host license conditions, including arrangements for off-site land disposal.

## **Item No. 11.7: Radioactive Waste Disposal Procedure**

Radioactive waste is created as part of most research and development projects involving radioisotope labeled compounds. It may be regulated by the NRC, the EPA and their state counterparts.

Questions or concerns on the proper handling and disposal of radioactive waste should be directed to your supervisor, a member of the Site Radiation Committee, your business unit Radiation Safety Coordinator or a Radiation Safety Officer (RSO).

### Disposal Principles

Disposal of all radioactive materials is coordinated by the RSO or designate.

1. Sewer disposal of radioactive material requires approval from the Radiation Safety Committee.
2. Consult RSO before adding different radioisotopes to the same waste container.
3. Clearly label with the radioactive material symbol, laboratory containers used to accumulate or store radioactive waste.
5. To the extent possible, avoid generating mixed waste, i.e., waste regulated by EPA (RCRA waste) and NRC (LLRW). Consult with an RSO or Radiation Safety Coordinator.
6. Before ordering radioactive material containing radioisotopes with half-lives greater than 120 days, except H-3, C-14 and S-35, consult an RSO or Radiation Safety Coordinator.
7. Reduce the volume and activity of radioactive waste to the extent possible.
8. Limit the activity per container and use appropriate shielding on the container's exterior to keep radiation levels below 2 millirems per hour and as low as reasonably achievable (ALARA). Lead shielding or containers may not be incinerated.
9. Consult RSO if waste container's activity could exceed 1 mCi S-35.

10. All radioactive waste containing dry, liquid or scintillation vials, must be tagged with a completed Experimental Station Waste Tag. RCRA waste classification procedures apply and any appropriate EPA Hazardous Waste Codes must be added. On the back of this tag, a piece of radioisotope tape must be placed with the isotope activity and data recorded. All tags must also have the generator's name, signature, business unit, location and phone number. Consult an RSO if there are any questions.
11. Before transporting, properly decontaminate waste containing radioactivity and biohazardous material such as blood, blood products, BSL1, BSL2 or BSL3 organisms.

## **Radioactive Waste Packaging**

### Dry Waste Handling

- Dry waste consists of paper, plastics and limited quantities of glass and metal. It may contain trace quantities of liquid such as remains in an emptied sample tube.
- It is placed in a plastic lined 1 cubic foot cardboard container or fiber drum. When dry waste container is full, seal the yellow plastic liner with a tie or tape, seal the cardboard container with tape and tag with a completed Stine-Haskell Research Center waste tag.

### Liquid Scintillation Vials

- Plastic scintillation vials do not need to be emptied into the liquid waste jug. As long as the case is not larger than 15"x15"x15", they may be put back into the original case and discarded when the case is full. Alternatively, they can be placed in plastic waste jugs and handled as liquid waste.
- Glass scintillation vials are incinerated in limited numbers due to the incinerator's limited glass handling capacity. Plastic vials should be used whenever possible. Place glass scintillation vials in plastic one-gallon jugs for handling as liquid waste.
- Scintillation cocktails containing hazardous chemicals (RCRA regulated) require RSO approval prior to ordering. Mixed waste (regulated by EPA and NRC) creates special challenges and additional disposal costs. Use non-RCRA scintillation cocktails such as Packard UltimaGold whenever possible.
- Consult chemical disposal procedure for classification of any RCRA (EPA regulated) waste.
- Place completed waste tag on box or jug of scintillation vials so tags are on the exterior (outside of bagged jug) and readily visible.

### Liquid Waste Handling

- Through process knowledge, evaluate liquid waste for classification under RCRA. Consult chemical waste disposal procedure.

- Place liquid waste in one gallon, wide-mouth, plastic jug, no more than 3/4 full, inside a 4-mil yellow plastic bag (Stores No. 301660) and placed in a plastic pail (secondary container) or equivalent.
- Limit S-35 to 1 mCi in any one container. Sample liquid waste containing S-35 and determine its activity. The results must be listed on the waste tag, in disintegrations per minute (DPM) of the sample and microcuries of the entire container. The scintillation count results should also be retained with the laboratory wipe tests results.

**Attachment 1: Financial Assurance Certificate**

Page 1 of 4



E. I. du Pont de Nemours and Company  
Legal, D-7096-2  
1007 Market Street  
Wilmington, Delaware 19898

Nancy A. Sandell  
Sr. Legal Assistant  
(302)774-4406  
(302)774-1189 (FAX)  
(800)248-5260 (FAX)

March 16, 2001

NORM HENRY  
CR&D  
STINE (RM 16)

**RE: SELF-GUARANTEE**

Attached for your files is an updated Self-Guarantee, signed by Gary Pfeiffer, the Chief Financial Officer of the DuPont Company. Please maintain this document at your site.

If you have any questions, please call.

A handwritten signature in cursive script that reads "Nancy A. Sandell".

NANCY A. SANDELL

Attachment

**Attachment 1: Financial Assurance Certificate**

Page 2 of 4



DuPont Finance

DuPont Finance  
Suite 3000 DuPont Bldg.  
1007 Market Street  
Wilmington, DE 19898  
Tel. (302) 774-0567  
Fax (302) 774-7869

Gary M. Pfeiffer  
Senior Vice President  
and  
Chief Financial Officer

March 16, 2001

United States Nuclear Regulatory Commission  
Region I  
476 Allendale Road  
King of Prussia, PA 19406-1415

**Re: E. I. du Pont de Nemours and Company  
Self-Guarantee  
Stine-Haskell Research Center - License No. 07-13441-02  
Docket No: 030-20681  
Control No: 119309**

Gentlemen:

I am the chief financial officer of E. I. du Pont de Nemours and Company (DuPont) located at 1007 Market Street, Wilmington, Delaware 19898. This Self-Guarantee is provided by DuPont to the United States Nuclear Regulatory Commission (the "Commission") pursuant to 10 CFR Part 30 Appendix C for License No. 07-13441-02 (Stine Haskell Research Center). Licensee's decommission costs for the Stine Haskell Research Center are estimated at \$10.2 Million.

- A. This guarantee will remain in force unless the licensee sends notice of cancellation by certified mail to the Commission. Cancellation may not occur, however, during the 120 days beginning on the date of receipt of the notice of cancellation by the Commission, as evidenced by the return receipt.
- B. The licensee shall provide alternative financial assurance as specified in the Commission's regulations within 90 days following receipt by the Commission of a notice of cancellation of the guarantee.
- C. The guarantee and financial test provisions must remain in effect until the Commission has terminated the license or until another financial assurance method acceptable to the Commission has been put in effect by the licensee.
- D. The licensee will promptly forward to the Commission and the licensee's independent auditor all reports covering the latest fiscal year filed by the

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Stine-Haskell Research Center, Newark, Delaware  
License 07-13441-02 Renewal Application

September, 2001

**NONNEGOTIABLE**

**Attachment 1: Financial Assurance Certificate**

Page 3 of 4

licensee with the Securities and Exchange Commission pursuant to the requirements of Section 13 of the Securities and Exchange Act of 1934.

- E. If, at any time, the licensee's most recent bond issuance ceases to be rated in any category of "A" or above by either Standard and Poors or Moodys, the licensee will provide notice in writing of such fact to the Commission within 20 days after publication of the change by the rating service. If the licensee's most recent bond issuance ceases to be rated in any category of A or above by both Standard and Poors and Moodys, the licensee no longer meets the requirements of Section II.A. of this appendix.
- F. The licensee will fund and carry out the required decommissioning activities or, upon issuance of an order by the Commission, the licensee will set up and fund a trust in the amount of the current cost estimates for decommissioning.

This firm is required to file a Form 10K with the Securities and Exchange Commission (SEC) for the latest fiscal year.

The fiscal year of this firm ends on December 31. The figures for the following items marked with an asterisk are derived from this firm's independently audited, year-end financial statements and footnotes for the latest completed fiscal year, ended December 31, 2000. DuPont will repeat passage of the financial test within 90 days after the close of each fiscal year.

**FINANCIAL TEST**

(In Millions)

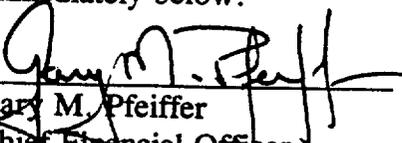
1.	Current decommissioning cost estimates.....	\$10.2
2.	Current bond rating and name of rating service.....	AA- Standard & Poors
*3.	Tangible Net Worth.....	\$ 4,934
*4.	Total Assets in the U.S. ....	\$24,894
5.	Are total U.S. assets and Tangible Net Worth each at least 10 times the total current decommissioning cost estimate for all decommissioning activities for which E. I. du Pont de Nemours and Company is responsible as self-guaranteeing licensee and as parent-guarantor?.....	Yes

\*Denotes figures derived from audited financial statements

**Attachment 1: Financial Assurance Certificate**

Page 4 of 4

I hereby certify that the wording of this letter meets the requirements specified in 10 CFR Part 30 Appendix C as such regulations were constituted on the date shown immediately below.

  
\_\_\_\_\_  
Gary M. Pfeiffer  
Chief Financial Officer

March 16, 2001

## **Resume of Radiation Safety Officer (RSO) TRAINING AND EXPERIENCE**

### **Radiation Safety Committee Chairperson**

**Mr. Eric A. Benner**

**Objective:** List of training and experience using radioisotopes as a qualification for the position of Chairperson of the Stine-Haskell Radiation Safety Committee.

**Education:** 1981                      **BS in Geology from University of Delaware**

                  October 1990            **Stuart/Kline Radiation Safety Course. Eight hour Presentation on isotopes and NRC regulations, guidelines**

                  September 1990        **Stine-Haskell Radiation Orientation Course**

                  1985 to Present        **Annual Radiation refresher course**

**Experience:** 1985 to Present - Use of Tritium in a number of biological assays including: saturation assays; displacement assays; kinetic assays; gel separation; and photo affinity labeling.

1985 to 1996 - Use of Sulfur 35 in a number of biological assays such as saturation, kinetic, and displacement.

1990 - A few experiments using I-125

1993 to Present - Served on Radiation Safety Committee and participated in annual lab inspections, annual review of the radiation program, and the quarterly committee meetings.

## **Attachment 2: Resume of RSO and Radiation Safety Committee Chairperson**

Radiation Safety Officer (RSO) Training and Experience

**Mr. Norman W. Henry, III, M.S., C.I.H.**

### **Education:**

- BA in Chemistry from Lafayette College, Easton, Pennsylvania - 1966
- MS in Animal Science & Biochemistry, University of Delaware, Newark, Delaware - 1977

### **Training:**

- Radioactive Materials Training Course, 1972, Louviers ESD (A.E.C.) - 2 weeks
- 8-Hour Radiation Safety Trng. Seminar at Haskell Laboratory, October 10-11, 1984
- 4-Hour Radiation Hazardous Emergency Response Training Seminar, Stine-Haskell Research Center, April 30, 1991.
- Radiation Update Symposium, March 19&20, 1991
- Radiation Update Symposium, April 28, 1995
- Managing Ionizing Radiation Program for the Industrial Hygienist AIHCE, May 15&16, 1993.
- Selection of Portable Radiation Survey Equipment, PDC, AIHC&I, May 19, 1996
- Handling Naturally Occurring Radioactive Materials (NORM), PDC, AIHCE, May 21, 2000.

### **Experience:**

- Haskell Laboratory for Industrial Medicine and Toxicology, 1967-1980, used C-14 in metabolism studies.
- Radiation Committee Chairperson 1977-1990
- Assistant Radiation Safety Officer 1990-1993
- Primary RSO in 1993
- Primary RSO to present, Stine-Haskell Research Center, license DuPont
- Appointed to Delaware Radiation Authority, 1976
- Chairman of Delaware Radiation Authority, 1987
- Industrial Representation on Delaware Radiation Authority 1976-present (2001)
- Appointed to ACURI (Appalachian Compact of Users of Radioisotopes) 1989
- Board Member of ACUCI 1989 - present, Chairman of Technical Advisory Committee
- Health Physical Society Member
- Health Physical Society, RSO Section Member
- Delaware Valley Society for Radiation Safety (DVSRS) member
- A.I.H.A. Ionization Radiation Committee Member, 1993-present

### Attachment No. 3

#### Radiation Safety Officer Delegation of Authority

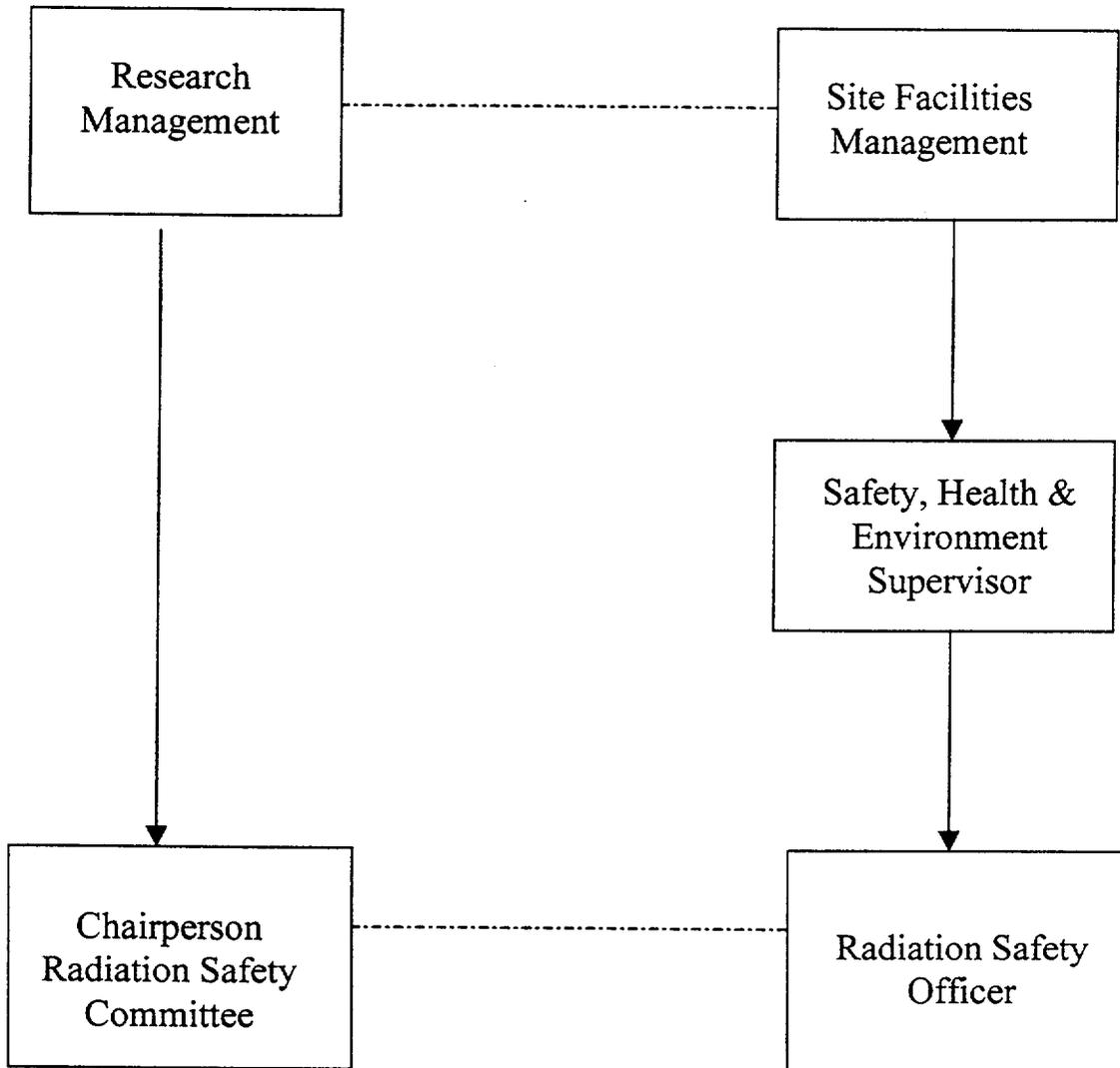
Norman W. Henry, III, has been appointed Radiation Safety Officer and is responsible for ensuring the safe use of byproduct material. The Radiation Safety Officer is responsible for managing the radiation safety program; identifying radiation safety problems; initiating, recommending or providing corrective actions; verifying implementation of corrective actions; and ensuring compliance with regulations for the use of byproduct material.

The Radiation Safety Officer is hereby delegated the authority necessary to meet these responsibilities. The Radiation Safety Officer has the authority to immediately stop any operations involving the use of byproduct material in which health and safety may be compromised or may result in non-compliance with NRC requirements.



Joseph J. Montovino  
Manager, Facilities and Operations  
Stine Haskell Research Center

**Attachment 4: Organizational Chart**



Stine-Haskell Research Center  
Radiation Safety Program

Site Facilities Services provides radiation safety resources to the research community.



## Stine Farm

**Field Radiation Surveys:** Once yearly (after study termination) soil samples are taken (1 inch in diameter x 12 to 15 inches deep) and sent to the Dupont Experimental Station for analysis. The analysis consist of sectioning the soil cores, freeze drying the soil, and combusting 1 gram x 3 reps (using a Harvey Oxidizer) ,collecting the  $^{14}\text{Co}_2$  in a scintillation vial and counting it on a scintillation counter.; this gives dpm/gram soil for each section (or depth).

Before a plot is decommissioned, the soil is assayed and confirmed at or below  $8 \times 10^{-4}$  or 1760 dpm/g soil. Typically, plots are well below this level after a study is terminated and the area brought as close to background as possible using good horticultural methods.

Plot sizes are usually 2.5' x 4', for plant metabolism studies and 3' x 11' for soil dissipation studies.

**E. I. DUPONT DE NEMOURS AND COMPANY  
DUPONT CROP PROTECTION  
GLOBAL TECHNOLOGY  
STINE HASKELL RESEARCH CENTER  
NEWARK, DELAWARE**

**STANDARD OPERATING PROCEDURE FOR  
STINE FARM 14C FIELD STUDIES**

Effective Date of this new or revised SOP:

Month \_\_\_\_\_ Day \_\_\_\_\_ Year \_\_\_\_\_

SUPERCEDES SOP: MP0003405 Effective date: 21 SEP 2000

Author Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Typed or Printed Name of Author: Gonzelous Young

Technical Reviewer Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Typed or Printed Name of Technical Reviewer \_\_\_\_\_

Management Representative Signature \_\_\_\_\_ Date: \_\_\_\_\_

Typed or Printed Name of Management Representative: Jeff Anderson

E. I. DU PONT DE NEMOURS AND COMPANY  
DU PONT AGRICULTURAL PRODUCTS  
GLOBAL TECHNOLOGY  
STINE-HASKELL RESEARCH CENTER  
NEWARK, DELAWARE

**STANDARD OPERATING PROCEDURE FOR STINE FARM 14C FIELD STUDIES**

**1.0 INTRODUCTION**

1.1 The following procedures should be used when conducting metabolism studies at Stine Farm <sup>14</sup>C Plot.

**2.0 PREPARATION FOR STUDY**

2.1 Study Director to Complete Project Planning Sheet.

2.1.1 Procure a planning sheet from the Radioisotope Field Study Coordinator and completely fill out.

2.1.2 Have it signed by your supervisor and a Crop Protection Products Radiation Safety Committee Member.

2.1.3 Send original to the Radioisotope Field Study Coordinator.

2.1.4 Submit protocol and design plan to Radiation Safety Officer.

2.2 Complete appropriate paperwork and packaging.

2.2.1 See SOP GP0008504 for proper Transporting of Radioactive Samples.

**3.0 CONDUCT OF STUDY**

3.1 Applicators go prepared with equipment essential to do the job.

3.1.1 The Radioisotope Field Study Coordinator can provide a Geiger Counter, Ludlum Model 44-9, one is also available at the Stine 250 greenhouse.

3.1.2 Clean-up kit that consisting of the following:

3.1.2.1 One Package Golf Towels

3.1.2.2 One Box of Disposable Gloves

3.1.2.3 Four Large Plastic Trash Bags

3.1.2.4 Kim Wipes

3.1.2.5 Empty Plastic Solvent Bottle

3.1.2.6 Radioactive Tape

3.1.3 All necessary application equipment, for example

3.1.3.1 Hand sprayer

- 3.1.3.2 Pipettes
- 3.1.3.3 Scissors
- 3.1.3.4 Hoffer Tubes
- 3.1.3.5 Garden Tools
- 3.1.3.6 Glassware
- 3.1.3.7 Masking Tape
- 3.1.3.8 <sup>14</sup>C agricultural chemical
- 3.1.3.9 Tyvek Suit
- 3.1.3.10 Personal Respirator
- 3.1.3.11 Any other necessary equipment

NOTE: Do not transport flammable solvents. Acetone and methanol are available at Stine 250 greenhouse.

### 3.2 After you arrive:

- 3.2.1 Wear safety glasses
- 3.2.2 Conduct yourself in a safe and professional manner.

### 3.3 Treatment Procedures

3.3.1 Prepare plot to minimize contamination when spray application is used. Examples of possible scenarios given below:

- 3.3.1.1 Pots: Prior to spray application, place 3 bamboo stakes into the pot and pull a plastic bag over the entire setup. Cut a small slit in the plastic bag approximately six inches above the surface to be sprayed. After spray application, cut the plastic bag and allow to air dry. Carefully remove the plastic bag and dispose of properly. The stakes can stay in place or be placed in the radioactive waste for proper disposal.
- 3.3.1.2 Plots: Prior to spray application, place a wooden stake in each corner of the plot. Wrap polyethylene around the stakes and secure with tape. Make sure that the bottom edge is placed inside the plot and the top edge is several feet higher than the surface to be sprayed. When finished spraying, let air dry and dispose of the plastic as radioactive waste. (Any drift will show up on the plastic as droplets).

3.3.2 Prepare <sup>14</sup>C treatment solution in your laboratory, if possible. If not, other options are building 120/room 102 ( the HOTC laboratory), S250 greenhouse laboratory, or next to your test plot.

#### 3.3.3 Plant spraying procedure

- 3.3.3.1 Wear Tyvek suit, disposable gloves, and respirator while spraying.
- 3.3.3.2 Clean-up after spraying.

3.3.3.3 Remove contaminated clothing.

3.3.4 Soil treatment procedure

3.3.4.1 Wear disposable labcoat and gloves

3.3.4.2 Transport treatment solution to  $^{14}\text{C}$  site using a secondary container.

3.3.4.3 Apply the treatment solution to the soil by pipette or other suitable device held just above soil surface.

3.4 Clean-Up Procedures

3.4.1 Place all waste in a double plastic bag. Seal the bag with masking tape. Label with radioactive tape and attach a properly completed radioactive waste tag. Place in a 10 gallon fiber pack. Have waste transported to the Experimental Station for disposal.

3.4.2 Check all work areas and yourself with Geiger Counter (Ludlum Model 44-9).

4.0 PROCEDURE FOR CROP/SOIL HARVEST ONLY (NO SPRAYING)

4.1 Take disposable gloves, plastic bags, scissors, hoffer tubes, and other equipment necessary to harvest crops or sample soil.

4.2 Wear disposable labcoat and gloves.

4.3 Follow procedures in 3.4.

4.3 Monitor for  $^{14}\text{C}$  as needed.

4.4 Clean the mode of transport (cart, truck, etc.) in a manner suitable for the handling of radioactive substances.

5.0 TERMINATION OF EXPERIMENT

5.1 At least one day prior to terminating a study, notify the Radioisotope Field Study Coordinator so that proper documentation on the  $^{14}\text{C}$  plot can be done.

5.2 Appropriate SOPs

5.2.1 Transporting radioactive samples. See SOP GP0008504

5.2.2 The disposal of radioactive waste. See DuPont Facilities Services Waste Management Waste Guide/Radioactive Samples.  
See Wilmington Area SHE manual – section 21-9.

5.2.3 Instructions for using the Ludlum model 3 survey meter. See operators manual.

6.0 PLOT TESTING FOLLOWING EXPERIMENT TERMINATION

6.1 Prior to considering the portion of the plot in question to be decommissioned, all signage designating the area will remain in place and the following will be done:

6.1.1 All vegetation (if any) will be removed and sent to the DuPont Experimental Station for incineration as radioactive waste.

6.1.2 Soil Testing

- 6.1.2.1 Six to eight soil core samples will be taken to a depth of approximately 18 inches. Cores will be divided into smaller segments. Corresponding segments from each core will be pooled, thoroughly mixed, and analyzed for  $^{14}\text{C}$  by combustion and liquid scintillation counting.
- 6.1.2.2 Background will be defined by combustion analysis of soil samples taken outside of the plot area. Recovery of  $^{14}\text{C}$  from the soil will be determined by analyzing soil from outside of the plot area spiked with a known quantity of  $^{14}\text{C}$ . Comparison of these results will be made with liquid scintillation counter analysis of vials spiked with the same quantity of  $^{14}\text{C}$ .
- 6.1.2.3 Soil will be removed from the plot to a level where the soil radioactivity is at background.
- 6.1.2.4 Removed soil will be sent to the DuPont Experimental Station for incineration.
- 6.1.2.5 The soil removed from the plot will be replaced with soil from outside of the plot area.

**Environmental Studies Project Planning Sheet  
&  
Authorization to Conduct C-14 Field Plot Study**

Request is made to use \_\_\_\_\_ mCi (total amount) of C-14 labeled  
 \_\_\_\_\_ (Compound) \_\_\_\_\_ (Labels)  
 To be used at \_\_\_\_\_ (Location)  
 AMR# \_\_\_\_\_ (Type of Study)  
 Proposed Study Start Date: \_\_\_\_\_ Estimated Completion Date: \_\_\_\_\_

The following conditions apply:

- \_\_\_\_\_ mCi per field plot (maximum limit)\*\*
- \_\_\_\_\_ plot size
- \_\_\_\_\_ number of plots
- \_\_\_\_\_ number of applications
- \_\_\_\_\_ method of application

\*\* 1 mCi limit per plot at Stine Farm, Newark, DE 19703

By the following users:

Printed Name	Location	Extension	Signature
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

( ) Using a separate sheet for additional users.

We have/have not (circle one) conducted a field plot study in the past year at the above location.

Safety equipment to be used (mark all that apply):

Spill control: \_\_\_\_\_ Absorbent Pad \_\_\_\_\_ Clean Up Kit \_\_\_\_\_ Other (Specify) \_\_\_\_\_

Contamination Detection: \_\_\_\_\_ Survey Meter \_\_\_\_\_ Other (Specify) \_\_\_\_\_

PPE: \_\_\_\_\_ Gloves & Glasses \_\_\_\_\_ Lab Coat \_\_\_\_\_ Tyvek® Suit

\_\_\_\_\_ Full Face Respirator \_\_\_\_\_ Half Mask Respirator

\_\_\_\_\_ Other (Specify) \_\_\_\_\_

Harvesting process (Check all that apply):

Samples harvested are: \_\_\_\_\_ Liquid \_\_\_\_\_ Dry (plant material) \_\_\_\_\_ Soil

\_\_\_\_\_ Other (Specify) \_\_\_\_\_

**Disposal process (Check all that apply)**

Waste Produced: \_\_\_\_\_ Plant Material \_\_\_\_\_ Soil \_\_\_\_\_ Dry \_\_\_\_\_ Liquid

\_\_\_\_\_ Other (Specify) \_\_\_\_\_

**Method of obtaining:**

\_\_\_\_\_ Within the same license (supply information on origin)\*\*

\_\_\_\_\_ Transfer to another licensed facility (supply information on origin)\*\*  
(Also requires signature of field station RSO)

\*\* Origin: \_\_\_\_\_

**Study Director Certification:**

The users listed above have received the appropriate training to use the material requested. The material will only be used as described, by the persons listed and in quantities specified. Any proposed changes will be reviewed with the AG Radiation Safety Committee Member for Field Studies. I understand that a new form may need to be submitted. I accept responsibility for the work performed under my direction.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Printed Name/Phone/Date

**Study Approval Signatures**

**Group Supervisor/Technical Leader:**

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Printed Name/Phone/Date

**AG Radiation Safety Committee Member for Field Studies**

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Printed Name/Phone/Date

**Field Station RSO (If study not conducted at Stine Farm, Newark, DE)**

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Printed Name/Phone/Date

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Printed Name/Phone/Date

**Study Notifications**

\_\_\_\_\_ ESL Radiation Safety Office (E272) (695-9632) (Fax: 695-8489)

\_\_\_\_\_ SHRC Radiation Safety Office (S310) (451-4500) (Fax: 451-4545)

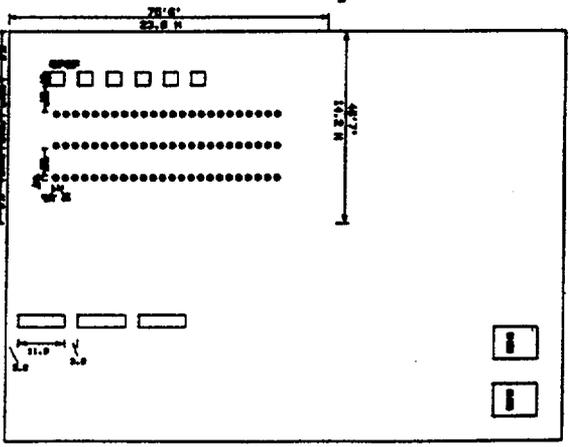
\_\_\_\_\_ Other (specify) \_\_\_\_\_

A/Ø3S

110.0



120.0 25.0 15.0



8.0 8.0 8.0 8.0

A/Ø2S

NOTE: SINGLE DIMENSIONS ARE ENGLISH (FEET)  
DOUBLE DIMENSIONS ARE ENGLISH / METRIC

SCALE 1" = 30'  
RLM 02/1/99

## Farm Station C14 License Checklist

- Geiger Counter – Annual calibration needed - copy to Jeff Guseman.
- Annual Radiation Training – Site RSO – copy to Jeff Guseman.
- Annual soil cores – California, Texas Field station – bi-annual - contact Jeff Guseman for instructions.
- Annual report to management regarding C14 use at site – cc Jeff Guseman.
- | <u>14C Limits Site</u> | <u>Plot</u> |
|------------------------|-------------|
| California – 10mCi     | 2mCi        |
| Florida – 14mCi        | none        |
| Illinois – 10mCi       | 3mCi        |
| Texas – 10mCi          | none        |

**Jeff C. Guseman – RSO for Field Studies**  
DuPont Agricultural Products  
Experimental Station  
Building E253  
Wilmington, DE 19880-0253  
Tel. (work) (302) 695-9145  
Fax. (302) 695-4460  
Tel. (home) [REDACTED]

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BY NRC. NO COPY OF THIS INFORMATION  
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Global Technology Electronic SOP Storage and Retrieval System

Date and Time Printed - 26-MAR-1993 10:51:36.37

Title: SOP for TRANSPORTING RADIOACTIVE SAMPLES

Effective Date: 10/15/87 Author(s): R. ANDERSON

Revision Date: 09/01/92 SOP Type: P I=Instrument P=Procedure

Review Date: 08/17/92  
SOP file: GP0008501.LIS

Section: G  
A=Analytical T=Toxicology  
M=Metabolism Q=Quality Assurance  
R=Residue G=General

\_\_\_\_\_  
Prepared or Revised By Author      Date

\_\_\_\_\_  
Approved by Management Designate      Date

\_\_\_\_\_  
Approver Printed Name      Date

This page signifies that an approved and signed original  
SOP is on file in the SOP Archive.

E. I. DU PONT DE NEMOURS AND COMPANY  
DU PONT AGRICULTURAL PRODUCTS  
GLOBAL TECHNOLOGY  
ENVIRONMENTAL STUDIES SECTION  
EXPERIMENTAL STATION  
WILMINGTON, DELAWARE 19880-0402

STANDARD OPERATING PROCEDURES FOR  
TRANSPORTING RADIOACTIVE SAMPLES

1.0 INTRODUCTION

1.1 The following procedures must be used for the transportation of radioactive samples by Environmental Studies personnel.

2.0 SAFETY

2.1 All users of any radioisotopes must receive an orientation from the Site Radiation Safety Office prior to working with any radiolabeled material. In addition, review the appropriate Experimental Station "Safety and Fire Guide" guidelines, "Building 402 Radioisotope Procedures" and the Standard Operating Procedures governing the safe handling of radioisotopes prior to beginning any work using radioactive material.

3.0 CLASSIFICATION OF RADIOACTIVE SAMPLES

3.1 All radioactive samples which are transported by Environmental Studies personnel fall into one of the following categories.

3.1.1 "Non-Radioactive" Materials per Department of Transportation (DOT) Regulations.

"Materials in which the estimated specific activity is not greater than 0.002 uCi/g (<4400 dpm per gram) of material, and in which the radioactivity is essentially uniformly distributed are not considered radioactive materials by the DOT".

3.1.2 "Radioactive Material, Limited Quantity, N.O.S."

Carbon-14 samples containing > 0.002 uCi but less than 60 mCi per DOT CFR 49 Part 173.421.

3.2 When a sample must be transported before the radioactivity of its content has been determined (e.g. tissue or soil samples being returned to the Experimental Station for analyses) the study director or designate must classify the material in accordance with all that is known about the sample (e.g. concentration applied, time of exposure, weight of sample taken, etc.). If it is not certain that the specific activity is low enough to classify as Non Radioactive, the sample must be classified as "Radioactive Material, Limited Quantity, N.O.S."

3.3 NOTE: In some cases, samples may be considered hazardous for other reasons (e.g. poisonous liquid or solid). Necessary procedures for the transportation of solvents or other chemicals used are not covered in this Standard Operating Procedure.

#### 4.0 SAMPLE LABELING

##### 4.1 Sample Identification.

"Non-Radioactive" (per DOT regulations) and "Radioactive Materials, Limited Quantity, N.O.S." samples MUST NOT be labeled "RADIOACTIVE MATERIAL" on the outside of the box. Each sample label should include:

{ name of study director or designate (The NAME MUST APPEAR on the outer shipping container of any sample that will be received by the Residue Program Coordinator at the Experimental Station).

{ compound

{ study

{ sample

{ date

{ any other appropriate information

#### 5.0 SAMPLE PACKAGING.

##### 5.1 "NON-RADIOACTIVE" MATERIALS per DOT Regulations.

Samples must not be labeled "Radioactive Materials" on the outside of the box. The contents inside the box MUST be labeled with a "Radioactive Materials" sticker and a placard (provided by

shipping) must be placed inside the box (or attach to Waybill) with the following:

"THIS PACKAGE CONFORMS TO THE CONDITIONS AND LIMITATIONS SPECIFIED IN 49 CFR 173.422 FOR EXCEPTED RADIOACTIVE MATERIAL, INSTRUMENTS AND ARTICLES, UN2911."

- 5.1.1 PLANT OR ANIMAL MATERIAL should be placed in a polyethylene or residue (reinforced cloth) bag and sealed securely. The bag must be labeled completely (see 4.0) to insure proper identification of the sample. Affix a "Radioactive Materials" sticker to the secondary bag. Place the bags in a Styrofoam cooler or heavy-duty cardboard box. Fill with ice or dry ice if appropriate. Close the container and strap (tape or bind securely) for transporting.
- 5.1.2 SOIL SAMPLES for analyses should be placed in a polyethylene or residue bag and seal securely. Affix a "Radioactive Materials" sticker to the secondary bag. If a large quantity of soil is taken, place the polyethylene bag in a 10 gal. fiber pak (<35 lbs./pak) and tape the fiber pak lid securely in place. Label completely (see 4.0) to insure proper identification.
- 5.1.3 STAINLESS STEEL CYLINDERS OR PLASTIC "ZERO CONTAMINATION" TUBES FILLED WITH SOIL should be capped with plastic caps then placed in a residue bag. Dry ice can be added to the bag then seal the bag securely. Affix a "Radioactive Materials" sticker to the secondary bag. The bag must be labeled (see 4.0) to insure proper identification of the sample. The bagged cylinder should then be placed in a heavy duty cardboard box. Do not overload a box with too many cylinders; it may become too cumbersome to handle safely. If dry ice was not added to the residue bag, fill dry ice around the bagged cylinder(s) in the box then seal the box securely. The box must be labeled (see 4.0) to insure proper identification of the sample.
- 5.1.4 SOILS CONTAMINATED WITH RADIOLABELED MATERIAL, i.e., soil remaining in greenhouse pots after all harvests have been made MUST be packed into a 10 gal. fiber pak lined with two 20 gal. polyethylene bags. Affix a "Radioactive Materials" sticker to the secondary bag. Do not exceed 35 lbs of soil and plant debris in any fiber pak. Seal the polyethylene bag,

label (see 4.0), then tape the fiber pak lid securely in place.

5.2 "RADIOACTIVE MATERIALS, LIMITED QUANTITY, N.O.S."

The following types of "Radioactive Materials, Limited Quantity, N.O.S. (see 3.1.2) must be packaged the same as in 5.1, except a placard (provided by shipping) must be placed inside the box (or attached to the Waybill) with the following:

"This Package Conforms To The Conditions And Limitations Specified in 49CFR 173.421 For Excepted Radioactive Material, Limited Quantity, N.O.S. UN2910"

- 5.2.1 A SOLUTION OR SOLID should be contained within a securely capped vial or bottle. Polypropylene vials or bottles may be used if sample integrity can be guaranteed. The container must be labeled completely (see 4.0) to insure proper identification of the sample. A "RADIOACTIVE MATERIALS" sticker must be affixed to the sample container. The sample container MUST be placed in a secondary container made from plastic, PVC or the like. DO NOT use glass (unless required).
- 5.2.2 PLANT OR ANIMAL MATERIAL should be packaged the same as 5.1.1.
- 5.2.3 SOIL SAMPLES should be packaged the same as 5.1.2.
- 5.2.4 NOTE: There must be no significant removable surface contamination (1,000 dpm/100cm<sup>2</sup>) on the exterior of any of the above packages.

6.0 TRANSPORTATION TO AND FROM STINE/HASKELL

6.1 Transporting "Non-Radioactive" Samples from the Experimental Station to Stine Farm/Greenhouse, Haskell Laboratory, and Glasgow.

- 6.1.1 Obtain a Du Pont "Request for Shipping by AG Products form from E402/3317. Fill out completely, the study director or designate may sign it.
- 6.1.2 Take packaged sample material and completed request form to the Experimental Station Shipping and Receiving, Building 361 for proper

packaging. You will receive a pre-addressed bill of lading to be carried/shipped along with the packaged sample.

- 6.2 Transporting "Non-Radioactive" Materials from Stine Farm/Greenhouse to the Experimental Station
  - 6.2.1 Obtain a "Stine-Haskell Request for Shipping" form from Stine-Haskell Shipping and Receiving, Building 135, and fill it out completely. The study director or designate may sign it.
  - 6.2.2 Take the packaged sample material and completed request form to Stine/Haskell Shipping and Receiving, Building 135. Give the request form and the shipping form to the attendant. You will receive a pre-addressed bill of lading to be carried/shipped along with the packaged sample to the Experimental Station.
- 6.3 "Transporting "Radioactive Materials, Limited Quantity, N.O.S. Samples from the Experimental Station to Stine Farm/Greenhouse."
  - 6.3.1 Obtain a "Waybill To Transport Nonhazardous Or Limited Quantities Of Hazardous Samples By Employee-Driven Company (or Private Highway) Vehicle" from E402/ 3317. Fill out completely, have the study director sign it.
  - 6.3.2 An approval signature must be obtained from a Radiation Safety Committee Member for the transportation of all radioactive (>4400 dpm/g) materials.
  - 6.4.3 Take packaged sample material and completed Waybill to the Experimental Station Shipping and Receiving, Building 361, for proper packaging. You will receive a pre-addressed bill of lading to be carried/shipped along with the packaged sample.
- 6.4 Transporting "Radioactive Material, Limited Quantity, N.O.S." Samples from Stine Farm/Greenhouse to the Experimental Station.
  - 6.4 1 Obtain a "Stine-Haskell Request for Shipping" form from Stine-Haskell Shipping and Receiving (Building 135) and fill it out completely. The study director or designate may sign it.

- 6.4.2 An approval signature must be obtained from the Stine/Haskell Radiological Safety Official (Bld. 310) or designate at Haskell Laboratory for the transportation of all radioactive (>4400 dpm/g) materials from Stine Farm/Greenhouse.
- 6.4.3 Take radioactive samples and approved shipping form to Stine/Haskell Shipping and Receiving, Building 135. Shipping will package the sample properly. You will receive a pre-addressed bill of lading to be carried/shipped along with packaged sample to the Experimental Station.
- 6.4.4 Transport the samples to the Experimental Station in a Styrofoam cooler or heavy duty cardboard box. Fill with ice or dry ice if appropriate.

7.0 TRANSPORTING "Non-Radioactive" SAMPLES TO AND FROM OUT-OF-STATE SITE

- 7.1 To Out-of-State sites: Obtain a Du Pont "Request for Shipping by AG Products" form from E402/3317. Fill out completely, the study director or designate may sign it.
- 7.2 Take sample material and completed request to the Experimental Station Shipping and Receiving, Building 361 or E402/3317, for proper packaging and shipping.
- 7.3 Samples sent to the Experimental Station by Federal Express or by contract truck will have the Waybill filled out by the Field Station Manager. Federal Express (air) N.O.S. limited quantities are under 60 mCi.

8.0 TRANSPORTING "Radioactive Material, Limited Quantity, N.O.S." SAMPLES

- 8.1 Transporting "Radioactive Material, Limited Quantity N.O.S." Samples From the Experimental Station to Other Licensed Test Sites or Licensed Contract Facilities.
  - 8.1.1 All "Radioactive Material, Limited Quantity, N.O.S." that will be received by personnel under a N.R.C. license other than Du Pont Experimental Station N.R.C. must be accompanied by a LETTER OF TRANSMITTAL. This letter can be the Waybill if the following information is included:
    - { Recipient's N.R.C license number
    - { sample and quantity (# uCi's)

1999  
RADIATION SAFETY TRAINING FOR  
FOR DUPONT FIELD STATIONS

Training included the following to keep individual and collective doses ALARA:

1) Records to be maintained on file at field sites:

- a) All Protocols and correspondence on all 14C studies.
- b) All shipping and receiving invoices.
- c) Survey results of "lab" area after formulation.
- d) Amount of radioactivity on site.
- e) Completed Project Planning/Authorization to Conduct C-14 Plot Studies Form.
- f) State and Federal forms that must be posted.

2) Receiving and Opening Packages:

- a) Packages containing radioisotopes are to be checked with the Geiger Counter to check for contamination as soon as possible -after receiving.
- b) If package arrives damaged, the study director and Jeff Guseman (RSO for Field Studies - 302-695-9145) should be notified immediately.
- c) Packages are to be placed in a secondary container and placed in the freezer in a secured area with "Caution Radioactive Materials" sign clearly showing.

3) Storage and Control of Radioactive Materials:

- a) Storage of radioactive materials will be only until the study director, or authorized user, arrives to set out study
- b) The radioactive materials must be secured at all times.

- c) Know C-14 limits for Field Station and test plots.
- d) Secure C-14 field plot area by keeping locked at all times.
- e) Radioactive waste will not be stored at the field stations.

#### 4) Decommissioning of Test Plots:

- a) Decommissioning will be performed under the instruction of The RSO for Field Studies.
- B) Soil combustion levels for decommissioning must be 100 dpm//gram Or less, typically twice background.

#### 5) Shipping of Treated Material:

- a) Radioactive materials must be double bagged and placed in a heavy-walled box with the bags marked as radioactive materials. UN2910 excepted package-limited quantity of material statement must be placed inside each box. Do not label outside of boxes as radioactive only inner bags.
- b) Specific instructions on shipping radioactive materials will be given by myself, Jeff C. Guseman, prior to shipping.

#### 6) Safe handling of Treated Materials:

- a) Proper gloves are to be worn at all times when handling radioactive materials, A disposable lab coat should also be worn
- b) Only users stated on the license, under the supervision of the Field Station RSO or the RSO for Field Studies shall use radioactive material. (Note each license has specific wording)

#### 7) Contamination Survey:

- a) If a compound is formulated in the "lab" area, a survey must be performed with a Geiger-counter to check for gross contamination, then a wipe test of the area performed. The vials are to be sent to the Experimental Station for counting. The results will be sent to the field station and kept on file.

b) Contamination areas must be cleaned up using a strong detergent, then properly packaged and shipped to the Experimental Station for disposal, then a wipe test performed.

c) The Ludlum Geiger Counter must be re-calibrated annually.

8) Proper "Return of Materials":

a) All materials returning to the Experimental Station must be properly packaged and labeled.

b) All returning materials must be DRY!

9) Radioactive Materials License:

a) RSO must be familiar with the license to maintain compliance.

b) Any deviation from the license requires prior amendment to the license.

c) We are committed to the principles of ALARA (As Low As Reasonably Achievable).

Jeff C. Guseman  
Radiation Safety Officer for Field Studies

(Please sign and date)

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**DELAWARE HEALTH  
AND SOCIAL SERVICES**

DIVISION OF PUBLIC HEALTH

July 19, 1995  
Reg. No 2092BRN

E.I. Dupont Company  
Stine Haskell Research Center  
P.O. Box 50 Stine Bldg 310  
Newark, DE 19714

Dear Mr. Henry:

We have considered your request for us to provide concurrence with your plans for (radioactive) field studies regarding DE registration 2092BRN or a letter that such a review is not needed.

We hereby decline the opportunity to renew your plans for field studies because the radioactive material in question is not NARM but rather byproduct material. Note-NARM and byproduct material are defined in DRCR Sec. A.2-Definitions.

Our declination is in accordance with Sec. A.1 of the Delaware Radiation Control Regulations [DRCR] that states in part: "...nothing in these regulations except Sec.B.4(a), shall apply to any person to the extent such person is subject to regulation by the US Nuclear Regulatory Commission." Furthermore, your attention is directed to the fact that regulation by the State of source material, byproduct material, and special nuclear material in quantity not sufficient to form a critical mass is subject to the provisions of an agreement between State and to U.S. Nuclear Regulatory Commission.

Your offer for us to review the plans for field studies is appreciated but none-the-less declined.

If you should have any comments regarding this matter, please feel free to let us know.

Sincerely,

Allan C. Tapert  
Program Administrator  
Office of Radiation Control

ACT:tjd  
cc:J. Beaman OPRPE

September 20, 1995

**Environmental Studies Project Planning Sheet  
&  
Authorization to Conduct C-14 Field Plot Study**

Request is made to use 14C-Methomyl 3 mCi (total amount) of C-14  
 (Compound) Methomyl [1-<sup>14</sup>C](Labels)  
 To be used at Stine Farm Metabolism Field plots (Location)  
DuPont-6590 Tomato Metabolism Study  
 Proposed Study Start Date: July 15 2001 Estimated Completion Date: October 15 2001

The following conditions apply:

3 mCi per field plot (maximum limit)  
0.75 x 1.2 m plot size  
1 number of plots  
1 number of applications  
spray method of application

**By the following users:**

Printed Name	Location	Extension	Signature
<u>David L. Ryan</u>	<u>S315/2102</u>	<u>13581</u>	<u>[Signature]</u>
<u>James A. McMillan</u>	<u>S315/2133B</u>	<u>15855</u>	<u>[Signature]</u>
<u>Gonzelous Young</u>	<u>S315/2137B</u>	<u>15863</u>	<u>[Signature]</u>

( ) Using a separate sheet for additional users.

We have not conducted a field plot study in the past year at the above location.

**Safety equipment to be used (mark all that apply):**

Spill control:  Absorbent Pad  Clean Up Kit  Other (Specify) \_\_\_\_\_

Contamination Detection:  Survey Meter  Other (Specify) \_\_\_\_\_

PPE:  Gloves & Glasses  Lab Coat  for applicator Tyvek® Suit

for applicator Full Face Respirator  Half Mask Respirator

\_\_\_\_\_ Other (Specify) \_\_\_\_\_

**Harvesting process (Check all that apply):**

Samples harvested are: \_\_\_\_\_ Liquid  Dry (plant material) \_\_\_\_\_ Soil

\_\_\_\_\_ Other (Specify) \_\_\_\_\_

**Disposal process (Check all that apply)**

Waste

Produced: \_\_\_\_\_  Plant Material \_\_\_\_\_  Soil  Dry  Liquid

\_\_\_\_\_ Other (Specify) \_\_\_\_\_

**Method of obtaining:**

\_\_\_\_\_  Within the same license (supply information on origin)\*\*

\_\_\_\_\_ Transfer to another licensed facility (supply information on origin)\*\*  
(Also requires signature of field station RSO)

\*\* Origin: DuPont APD Isotope Inventory No.: 555

**Study Director Certification:**

The users listed above have received the appropriate training to use the material requested. The material will only be used as described, by the persons listed and in quantities specified. Any proposed changes will be reviewed with the AG Radiation Safety Committee Member for Field Studies. I understand that a new form may need to be submitted. I accept responsibility for the work performed under my direction.

David L. Ryan  
Signature

DAVID L RYAN June 14 2001  
Printed Name/Phone/Date

**Study Approval Signatures**

**Group Supervisor/Technical Leader:**

Jeffrey J. Anderson  
Signature

Jeffrey J. Anderson June 18, 2001  
Printed Name/Phone/Date

**AG Radiation Safety Committee Member for Field Studies**

Norman W. Newkirk III  
Signature

NORMAN W. NEWKIRK III 6/25/01  
Printed Name/Phone/Date

**Field Station RSO (if study not conducted at Stine Farm, Newark, DE)**

Michael B. Oby  
Signature

Michael B. Oby 1-7592 14 June 2001  
Printed Name/Phone/Date

Erica A. Bann  
Signature

\_\_\_\_\_  
Printed Name/Phone/Date

**Study Notifications**

\_\_\_\_\_ ESL Radiation Safety Office (E272) (695-9632) (Fax: 695-8489)

SHRC Radiation Safety Office (S310) (451-4500) (Fax: 451-4545)

\_\_\_\_\_ Other (specify) \_\_\_\_\_

**Environmental Studies Project Planning Sheet  
&  
Authorization to Conduct C-14 Field Plot Study**

Request is made to use 14C-Methomyl 3 mCi (total amount) of C-14  
labeled  
 \_\_\_\_\_ (Compound) Methomyl \_\_\_\_\_ [<sup>14</sup>C](Labels)  
 To be used at Stine Farm Grape vines (Fredonia) (Location)  
DuPont-6589 Metabolism study (Type of Study)  
 Proposed Study Start Date: August 15 2001 Estimated Completion Date: October 15 2001

The following conditions apply:

3 \_\_\_\_\_ mCi per field plot (maximum limit)  
0.75 x 2 m \_\_\_\_\_ plot size  
1 \_\_\_\_\_ number of plots  
1 \_\_\_\_\_ number of applications  
spray \_\_\_\_\_ method of application

By the following users:

Printed Name	Location	Extension	Signature
<u>David L. Ryan</u>	<u>S315/2102</u>	<u>13581</u>	<u>[Signature]</u>
<u>James A. McMillan</u>	<u>S315/2133B</u>	<u>15855</u>	<u>[Signature]</u>
<u>Gonzelous Young</u>	<u>S315/2137B</u>	<u>15863</u>	<u>[Signature]</u>

( ) Using a separate sheet for additional users.

We have not conducted a field plot study in the past year at the above location.

Safety equipment to be used (mark all that apply):

Spill control:  Absorbent Pad \_\_\_\_\_ Clean Up Kit \_\_\_\_\_ Other (Specify) \_\_\_\_\_

Contamination Survey \_\_\_\_\_  
 Detection:  Meter \_\_\_\_\_ Other (Specify) \_\_\_\_\_

PPE:  Gloves & Glasses  Lab Coat  for applicator Tyvek® Suit

for applicator Full Face Respirator \_\_\_\_\_ Half Mask Respirator

\_\_\_\_\_ Other (Specify) \_\_\_\_\_

Harvesting process (Check all that apply):

Samples harvested are: \_\_\_\_\_ Liquid  Dry (plant material) \_\_\_\_\_ Soil  
 \_\_\_\_\_ Other (Specify) \_\_\_\_\_



Note: We will construct a wire mesh fence approximately 6 ft tall surrounding the single grape vine that will be treated. This area will be clearly marked as a radioactive field plot. During the application of test material a barrier consisting of adsorbent impermeable paper will be attached to this fence to stop application drift. This paper barrier will be removed and disposed as solid radioactive waste after the application. At the end of the study the vine will be removed and disposed as solid radioactive waste. Soil around the vine will be monitored for up to one year.  $^{14}\text{C}$ -Methomyl is mineralized by soil microbes, so it is expected that radioactivity in soil will completely dissipate as  $^{14}\text{C}$ -carbon dioxide. If soil is considered radioactive at the end of one year, it will be removed and disposed of as solid radioactive waste. If it is necessary to take down the fence, radioactive contaminated soil will be removed before the containment fence is removed.

Date: 6/18/01

7: DLRYAN

Time: 9:34:23 AM

# DLRYAN

3 Eric Benner 2 protocols  
(2 signatures)

Please sign and forward to Norm Henry  
for final signature

Thanks Dave Ryan  
1-3581

**ENVIRONMENTAL STUDIES  
PROJECT PLANNING SHEET**

TO: Jeff Guseman  
S250 Greenhouse

Study AMR#: DuPont-4518

Compound Name: Oxamyl (D1410)

Study Type (Crop Rotation, Plant Metabolism, Other): Crop Rotation

Study Director: Alethia Brown Loc: S315/2108 Phone: 451-3585

Objective of Study: Study oxamyl residues in barley after 30-day soil aging

Desired Study Start Date: Aug. 30, 2000 Est. Finish Date: Dec., 2000

How many crops will be needed? 1 How many replicates? 1

If isotopes to be used, what type? 14C How many different labels? 1

What method of application do you require? Spray on soil

How many applications will be made? 1

What will be the total quantity of isotopes used? 211  $\mu$ Cipot or 2107  $\mu$ Ci total

What crops do you require? Barley

To the best of your knowledge, is the test compound volatile? Yes

Is the primary metabolic pathway or degradation to CO<sub>2</sub>? Yes

Is the compound a known dermal or eye irritant? See MSDS attached

Are there any unusual inhalation hazards? inhalation hazard Is the LD<sub>50</sub> known? 2.8 mg/kg in mice

Are there restrictions on the use of non-test chemicals which will be used to maintain the study (insecticides, fertilizers, etc.)?: No

**Study Approvals:**

Study Director: Alethia M. Brown

Section Radioisotope Comm. Member: [Signature]

Group Supervisor: [Signature]

**ENVIRONMENTAL STUDIES  
PROJECT PLANNING SHEET**

TO: Jeff Guseman  
S250 Greenhouse

Study AMR#: DuPont-4520

Compound Name: Oxamyl (D1410)

Study Type (Crop Rotation, Plant Metabolism, Other): Potato Metabolism

Study Director: Alethia Brown Loc: S315/2108 Phone: 451-3585

Objective of Study: Metabolism of oxamyl in plants

Desired Study Start Date: Aug. 30, 2000 Est. Finish Date: Dec., 2000

How many crops will be needed? 1 How many replicates? 1

If isotopes to be used, what type? <sup>14</sup>C How many different labels? 1

What method of application do you require? Spray

How many applications will be made? 1

What will be the total quantity of isotopes used? 473  $\mu$ Cipot or 3784  $\mu$ Ci total

What crops do you require? Potatoes

To the best of your knowledge, is the test compound volatile? Yes

Is the primary metabolic pathway or degradation to CO<sub>2</sub>? Yes

Is the compound a known dermal or eye irritant? See MSDS attached

Are there any unusual inhalation hazards? hazard Is the LD<sub>50</sub> known? 2.8 mg/kg in mice

Are there restrictions on the use of non-test chemicals which will be used to maintain the study (insecticides, fertilizers, etc.)?:

**Study Approvals:**

Study Director: \_\_\_\_\_

Section Radioisotope Comm. Member: \_\_\_\_\_

Group Supervisor: \_\_\_\_\_

*Alethia M. Brown*  
*Jeff E. Brown*  
*Jeffrey J. Anderson*

CHAIN OF CUSTODY RECORD and  
CERTIFICATE OF ANALYSIS

21-AUG-2000 08:57

ISOTOPIC COMPOUND INVENTORY SYSTEM

Order #: 00082103      File Number: 0538  
Name:  
DPX #: DPX-JE874  
Radiolabel location.: [phenylamino-[14C](U)]  
Specific Act.: 58.820 uCi/mg  
Molar Act.: 22000.00 uCi/mmol  
Initial Radiopurity: 99.5 %      Date: 08/17/98  
Radiopurity: 99.5 %      Date: 08/17/98  
Amount: 199.600 mg  
Radioactivity: 11,620.70 uCi

Source: NEN  
Lot Number: 3350-043

Request:

Orderer: Mary T. Goetz  
Principal Invest.: Dian Lee  
AMR # or Study: JE874 Study for Dian Lee  
Location: S315 2106  
Req amount: 15.000 mg

Calibration Record:

Balance serial #      MANUAL

Filled:

Operator: Michael B. Ohm MB (Initials)  
Filled on: 08/18/00

Received by: Dust      Date: 8/22/00

Storage Conditions: Store frozen to reduce radiochemical decay.

Expiration Date: The radiochemical purity of this material needs to be determined before use because of possible radiodecay.

File No: 0538      Order No: 00082103  
Name:  
DPX #: DPX-JE874  
Radiolabel location.: [phenylamino-[14C](U)]  
Amount: 199.600 mg  
Radioactivity: 11,620.700 uCi

File No: 0538      Order No: 00082103  
Name:  
DPX #: DPX-JE874  
Radiolabel location.: [phenylamino-[14C](U)]  
Amount: 199.600 mg  
Radioactivity: 11,620.700 uCi

File No: 0538      Order No: 00082103  
Name:  
DPX #: DPX-JE874  
Radiolabel location.: [phenylamino-[14C](U)]  
Amount: 199.600 mg  
Radioactivity: 11,620.700 uCi

12-SEP-2000 14:29

ISOTOPIC COMPOUND  
SAMPLE MANAGEMENT

Order #	DPX #	ID	Amount	Radioactivity
00091203	JW062EL	0461	0.45 mL	0.37773000 mCi
Compound Name: JW062EL			LOX-	
Aldos C. Barefoot			GLP Study, Huntingdon Life Sciences, UK	

14 SEPT 2000

NORM-

THIS MATERIAL WAS OBTAINED BY ME  
ON BEHALF OF ALDOS C. BAREFOOT & SENT TO  
HLS IN ENGLAND FOR A GLP STUDY...

SENT 13 SEPT 2000

-MINE

*Exact Copy  
Sent to Pierce  
22 Aug 2000*

# Chain of Custody

[phenyl-<sup>14</sup>C(U)] Bensulfuron Methyl, HOTC #320

[phenyl-<sup>14</sup>C(U)] bensulfuron methyl, HOTC# 320, Order # 00032102, was purified using procedures found in DuPont notebook E72252-128.

Notebook reference: E72252-128-21 Specific Activity: 57.5  $\mu$ Ci/mg

Radiochemical purity: Ramona  
99.6% as of 05May2000

You are receiving 0.97 mg

Activity 56  $\mu$ Ci

Signed R. Seth Swain

Date 22 Aug 2000

Received by \_\_\_\_\_

Date \_\_\_\_\_

Exact Copy  
Sent to Ricerca  
22 Aug 2000

# Chain of Custody

[pyrimidine-2-<sup>14</sup>C] Bensulfuron Methyl, HOTC #319

[pyrimidine-2-<sup>14</sup>C] bensulfuron methyl, HOTC# 319, Order # 00032101, was purified using procedures found in DuPont notebook E72252-128.

Notebook reference: E72252-128-13 Specific Activity: 53.1  $\mu$ Ci/mg

Radiochemical purity: Ramona  
99% as of 05May2000

You are receiving 0.98 mg

Activity 52  $\mu$ Ci

Signed R. Scott Swain

Date 22 Aug 2000

Received by \_\_\_\_\_

Date \_\_\_\_\_

# Regulatory Sciences Shipping & Chain of Custody Form

✓  
rad.

Principal Investigator (PI) Name: Fred Q. Bramble  
 Lab Occupant Name (if different from PI): Anne M. Pentz  
 Phone (ExSta): x 51594  
 Location (ExSta, Bldg/Room): E402/3113  
 Phone (SHRC): x 13362  
 Location (SHRC, Bldg/Room): S315/1308

### Radioisotope Information

Radioisotope: <sup>14</sup>C  
 Total Radioisotope Quantity (in MBq and uCi): 109.88 uCi / 4.07 MBq  
 Test Substance: Benomyl  
 AMR or DuPont #: DuPont - 2845  
 Refrigeration Required (circle one): (YES) NO  
 Sample Matrix (circle all that apply): Soil Aqueous (Plant) Biological  
 Standard Form (circle one): (Solid) Liquid  
 Interim Storage Location (circle one): E402/5213 (E308)  
 Final Storage Location (bldg/room): S315/1332  
 Number of Boxes: 1

Comments:

NOTE: 1MBq = 27.3 uCi so conversion is 109.88 uCi / 27.3 = 4.07 MBq

### Analytical Standard Information

Standard (IN Code(s)?): \_\_\_\_\_  
 Compound Name (if available): \_\_\_\_\_  
 Total Quantity (specify units in g, mg, ug, etc): \_\_\_\_\_  
 AMR or DuPont #: \_\_\_\_\_  
 Refrigeration Required (circle one): YES NO  
 Standard Form (circle one): Solid Liquid  
 Interim Storage Location (circle one): E402/5213 (E308)  
 Final Storage Location (bldg/room): \_\_\_\_\_  
 Number of Boxes: \_\_\_\_\_

Comments:

### Authorized Signature Information

1) <u>David E. Felt</u>	<u>5/22/00</u>
Freezer/Refrigerator Recipient Signature	Date
2) <u>Gus Cordova</u>	<u>June 12, 2000</u>
RSO Designate Signature (EXSTA)	Date
3) <u>David M. Stinner</u>	<u>5/22/00</u>
Shipping Personnel Signature (DOT & RAD Cert)	Date
4) <u>Norm W. Henry</u>	<u>6/14/00</u>
RSO Designate Signature (STINE)	Date
5) <u>Anne M. Pentz</u>	<u>14 Jun 00</u>
Principal Investigator Signature & Date	Date

1. Freezer/refrigerator recipient signs form and keeps original
2. RSO designate at EXSTA (Gus Cordova or radiation safety office designate) signs and returns form to freezer/refrigerator recipient
3. Shipping designate signs and keeps form and transports materials to Stine S315 Dock
4. Shipping designate gives form to RSO designate at Stine S315 Dock for signature
5. RSO designate at Stine gives form to PI at Stine S315 for signature

NOTE: After final PI signature at Stine S315, the PI will append the original copy of this form to study records and forward a copy to the Stine RSO office, attention Norm Henry (S310/116)

Questions? Contact Mike Ohm (695-1119), Tara Crowe (695-6611), or Sonya Lawler (695-4468)



Thomas P Blaesser

08/09/99 09:09 AM

To: Norman W Henry/AE/DuPont@DuPont, Jeff C Guseman/AE/DuPont@DuPont  
cc:  
Subject: Radioactive Material Application

Norm,

On Friday August 6, 1999 an application of radioactive material was made to the soybeans growing in pots in the 14C plot at Stine Farm. A total of 6uci was applied. This was the last scheduled application for this portion of the Study. The plants will be grown to maturity in the 14C plot. If you have any questions or concerns please let me know.

Regards,  
Tom



Thomas P Blaesser

06/25/99 07:47 AM

---

To: Norman W Henry/AE/DuPont@DuPont, Jeff C Guseman/AE/DuPont@DuPont  
cc:  
Subject: Radioactive Material Application

Norm,

An application of radiolabeled  $^{14}\text{C}$  DPX-F6025 was made in the  $^{14}\text{C}$  Plot at Stine Farm on 6/24/99. A total of 48uci was applied to the soybeans being grown in containers. This was the second of three applications. If you have any questions please let me know.

Regards,  
Tom



Thomas P Blaesser

05/27/99 09:57 AM

---

To: Norman W Henry/AE/DuPont@DuPont, Jeff C Guseman/AE/DuPont@DuPont  
cc:  
Subject: Application of Radiolabeled Material

An application of radiolabeled DPX-F6025 was made on May,25 1999 in the 14C plot at Stine Research Farm. The material was applied to the soil surface of 8 - 11' pots , as part of Dupont 1963 Metabolism of DPX-F6025 in Soybean. A total of 80uci was applied. There will be additional applications made to the soybeans at approximately 30-60 day intervals. This study will be active until the end of October 1999. If you have any questions or concerns please let me know.

Regards,  
Tom

INTEROFFICE MEMORANDUM

Date: 25-Aug-1998 03:06pm  
From: JEFF C GUSEMAN  
GUSEMAJC  
Dept: AG PROD EXSTA E253  
Tel No: 302-695-9145 Fax 302-695-4460

TO: NORM HENRY

( HENRYNW )

Subject: Application Stine Farm 14c Test Area

Norm,

Tuesday, 8/18/98 I applied radiolabeled DPX JE874, AMR 4792-97 to two 2.5'x4.5' plots containing tomatoes. 0.3325mCi's per plot for a total 0,665 mCi's. This is the final application for this study, final harvest was Friday, 8/21/98.

Regards,  
Jeff

INTEROFFICE MEMORANDUM

Date: 14-Aug-1998 10:51am  
From: JEFF C GUSEMAN  
GUSEMAJC  
Dept: AG PROD EXSTA E253  
Tel No: 302-695-9145 Fax 302-695-4460

TO: NORM HENRY

( HENRYNW )

Subject: Application Stine Farm 14c Test Area

Norm,

Tuesday, 8/4/98 I applied radiolabeled DPX JE874, AMR 4792-97 to two 2.5'x4' plots containing tomatoes. 0.166 mCi's applied to each plot for a total of 0.3325 mCi's. There will be a second application on or about Tuesday, 8/18/98 with approx.the same ammount to be applied.

Regards,  
Jeff

INTEROFFICE MEMORANDUM

Date: 08-Jun-1998 10:40am  
From: JEFF C GUSEMAN  
GUSEMAJC  
Dept: AG PROD EXSTA E253  
Tel No: 302-695-9145 Fax 302-695-4460

TO: NORM HENRY

( HENRYNW )

Subject: Applications Stine Farm 14c Test Area

Norm,

Wednesday, 5/27/98 I applied radiolabeled DPX-MT484, AMR 4906-98 to bare soil to two 3' x 12.4' plots, 1.0 mCi each test plot, total 2.0 mCi's. This will be the only application for this study.

Thursday, 5/28/98 I applied radiolabeled DPX-TY029, AMR 4914-98 to bare soil to two 3' x 12.4' plots, 1.0 mCi each test plot, total 2.0 mCi's. This will be the only application for this study.

Regards,  
Jeff

4290-97

INTEROFFICE MEMORANDUM

Date: 01-Jun-1998 09:41am  
From: THOMAS P BLAESSER  
BLAESSTP  
Dept: AG ES S250 Greenhouse  
Tel No: 451-0840

TO: JEFF C GUSEMAN

( GUSEMAJC )

CC: NORM HENRY

( HENRYNW )

Subject: Radiolabeled MT484 Application

Jeff,

On Tuesday May 5, 1998 an application of radiolabeled MT484 was made in the C-14 plot at Stine Farm. A total of 70uci was applied to the soil surface of eight 5 gallon containers. After the appropriate aging periods, soybeans will be grown to maturity in the treated soil.

Regards,  
Tom

INTEROFFICE MEMORANDUM

4290-97

Date: 19-Jun-1998 11:18am  
From: THOMAS P BLAESSER  
BLAESSTP  
Dept: AG ES S250 Greenhouse  
Tel No: 451-0840

TO: NORM HENRY

( HENRYNW )

CC: JEFF C GUSEMAN

( GUSEMAJC )

Subject: Radiolabeled MT484 Application

Norm,

On Thursday June 18, 1998 an application of radiolabeled MT484 was made in the 14C plot at Stine Farm. A total of 34.8uci was applied to the soil surface of four 5 gallon containers. After the appropriate aging periods, soybeans will be grown in the treated soil.

Regards,  
Tom

INTEROFFICE MEMORANDUM

Date: 30-Apr-1998 10:28am  
From: THOMAS P BLAESSER  
BLAESSTP  
Dept: AG ES S250 Greenhouse  
Tel No: 451-0840

TO: JEFF C GUSEMAN

( GUSEMAJC )

CC: NORM HENRY

( HENRYNW )

Subject: AMR 4576-97 Aged soil in 14-C Plot

Jeff,

The final aging period has been surpassed for AMR 4576-97 and all pots of treated soil have been removed from the 14-C plot at this time.

Regards,  
Tom

INTEROFFICE MEMORANDUM

Date: 16-May-1997 12:09pm  
From: JEFF C GUSEMAN  
GUSEMAJC  
Dept: AG PROD EXSTA E253  
Tel No: 302-695-9145 Fax 302-695-4460

TO: NORM HENRY

( HENRYNW )

Subject: Applications Stine Farm 14c Plot

Norm,

On Wednesday, 5/14/97 I applied radiolabeled ML529 (0.35mCi) to a 3' x 12' area of bare soil, non glp study. This will be the only application for this study.

On Thursday, 5/15/97 I applied DPX- TY029, AMR 4579-97 on bare soil planted with soybeans to two 2.5' x4' plots. Plot 1, 97 uCi and Plot 2, 90uCi total 187 uCi's. There will be two additional applications made for this study.

Jeff C. Gusemman

INTEROFFICE MEMORANDUM

Date: 11-Jun-1997 10:21am  
From: JEFF C GUSEMAN  
GUSEMAJC  
Dept: AG PROD EXSTA E253  
Tel No: 302-695-9145 Fax 302-695-4460

TO: NORM HENRY

( HENRYNW )

Subject: Applications Stine Farm 14c Plot

Norm,

On Thursday, May 29, 1997 I applied the following radiolabeled material at the Stine Farm 14c plot,

DPX-TY029, AMR 4585-97 on bare soil planted with corn, (2) 2.5'x4' plots, 65.1 uCi each. This was the first of three applications.

On Tuesday, June 9, 1997 I applied the following radiolabeled material at the Stine Farm 14c plot,

DPX-TY029, AMR 4579-97 on soybeans, (2) 2.5'x4' plots, one 56 uCi, one 51 uCi. This was the second of three applications.

Jeff C. Guseman

INTEROFFICE MEMORANDUM

Date: 02-Jul-1997 09:41am  
From: THOMAS R TAYLOR  
TRTAYLOR  
Dept: Ag Products Department  
Tel No: 695-3564

TO: ALETHIA M BROWN  
TO: GONZELOUS A YOUNG

( BROWNAM )  
( YOUNGGA )

CC: JEFF C GUSEMAN  
CC: henry n

( GUSEMAJC )  
( HENRYNW )

Subject: AMR# 4585-97

Alethia,

On Tuesday, July 1, 1997, Dave Way, (Stine Farms Ag expert) observed the corn in the C14 plot from your TY029 Corn Metabolism Study, AMR# 4585-97 and told me 50% of it was at the V3 stage and the remaining 50% of the corn would be at the V3 stage by Wednesday, July 2, 1997. With this information and the forecast calling for rain Wednesday, I decided to treat the corn on Tuesday, July 1, 1997.

70.6 uci of C14 TY029 was transported from the experimental station to the Stine C14 plot where it was applied to the corn foliage. Following the application, corn samples were harvested and packed in a cooler containing dry ice. Approximately 5 uci of material in the harvested samples was brought back to the experimental station where the samples are being stored in the 253 greenhouse freezer.

Tom Taylor  
E253 Greenhouse

INTEROFFICE MEMORANDUM

Date: 10-Jul-1997 01:25pm  
From: JEFF C GUSEMAN  
GUSEMAJC  
Dept: AG PROD EXSTA E253  
Tel No: 302-695-9145 Fax 302-695-4460

TO: NORM HENRY

( HENRYNW )

Subject: Applications Stine Farm 14c plot

Norm,

On Friday, 6/20/97 I applied the following radiolabeled material at the Stine 14c plot.

DPX-KZ165, AMR 3880-96 to wheat, two 2.5'x4' plots, 0.9mCi per plot, 1st application.

On Wednesday, 7/9/97 I applied the following radiolabeled material at the Stine 14c plot.

DPX-KZ165, AMR 3880-96 to wheat, two 2.5'x4' plots, 0.9mCi per plot, 2nd and final application.

This was a continuation of a study started last year using the same plots.

Jeff C. Guseman

**INTEROFFICE MEMORANDUM**

**Date:** 17-Jul-1997 09:02am  
**From:** JEFF C GUSEMAN  
GUSEMAJC  
**Dept:** AG PROD EXSTA E253  
**Tel No:** 302-695-9145 Fax 302-695-4460

**TO:** NORM HENRY

( HENRYNW )

**Subject:** Application Stine Farm 14c Plot

Norm,

On Tuesday, 7/15/97 I applied the following radiolabeled material at the Stine 14c plot.

DPX-TY029, AMR 4579-97 on soybeans, (2) 2.5'x4' plots, 53 uCi to each plot. This was the third and final application.

Jeff C. Guseman

INTEROFFICE MEMORANDUM

Date: 14-Aug-1997 01:53pm  
From: JEFF C GUSEMAN  
GUSEMAJC  
Dept: AG PROD EXSTA E253  
Tel No: 302-695-9145 Fax 302-695-4460

TO: NORM HENRY

( HENRYNW )

Subject: Applications Stine Farm 14c Plot

Norm,

On Tuesday, 7/29/97 I applied radiolabeled DPX- MT484, AMR4289-97 on corn, (2) 2.5'x4' plots, 200 uCi to each plot. This will be the only application for this study.

On Friday, 8/8/97 I applied radiolabeled DPX-TY029, AMR 4585-97 on corn, (2) 2.5'x4' plots, 35 uCi to each plot. This was the third and final application for this study.

Jeff C. Guseman

INTEROFFICE MEMORANDUM

Date: 22-Dec-1997 11:05am  
From: THOMAS P BLAESSER  
BLAESSTP  
Dept: AG ES S250 Greenhouse  
Tel No: 451-0840

TO: NORM HENRY

( HENRYNW )

CC: JEFF C GUSEMAN

( GUSEMAJC )

Subject: AMR 4576-97 Final Application

Norm,

On Monday, December 22, 1997 the final application of radiolabeled Ty029 was made in the 14C plot at Stine Farm. A total of 8.4uci was applied to the soil surface of 4 pots. Previously, there was an identical application made on November 21, 1997. The pots of soil will be move into the greenhouse after a 30 day aging period. If you have any questions or concerns please let me know. Have a Happy Holiday!

Tom

INTEROFFICE MEMORANDUM

Date: 22-Oct-1997 11:36am  
From: THOMAS P BLAESSER  
BLAESSTP  
Dept: AG ES S250 Greenhouse  
Tel No: 451-0840

TO: NORM HENRY

( HENRYNW )

CC: JEFF C GUSEMAN

( GUSEMAJC )

Subject: AMR 4576-97 Application

Norm,

On Wednesday, October 22, 1997 an application of radiolabeled TY029 was made in the 14C plot at Stine Farm. A Total of 16.4uci was applied to the soil surface of 4 pots. There will be two additional applications at 30 day intervals.

Regards,  
Tom

INTEROFFICE MEMORANDUM

Date: 08-May-1997 11:51am  
From: THOMAS P BLAESSER  
BLAESSTP  
Dept: AG ES S250 Greenhouse  
Tel No: 451-0840

TO: NORM HENRY ( HENRYNW )

CC: JEFF C GUSEMAN ( GUSEMAJC )

Subject: AMR 4417-97 Initial Application

Norm,

On Wednesday May 7, 1997 the initial application of radiolabeled MJ644 was made in the C14 plot at Stine Farm. A total of 890.76 uci of C14 was applied to 24 cabbage plants being grown in pots, on pallets, in the C14 plot. There will be a total of 4 applications for this study. I will notify you when the additional applications are made.

Regards,

Tom

*completed*

INTEROFFICE MEMORANDUM

Date: 22-May-1997 07:06am  
From: THOMAS P BLAESSER  
BLAESSTP  
Dept: AG ES S250 Greenhouse  
Tel No: 451-0840

TO: NORM HENRY ( HENRYNW )

CC: JEFF C GUSEMAN ( GUSEMAJC )

Subject: AMR 4417-97 2nd Application

Norm,

On Wednesday, May 21, 1997 the second application of radiolabeled MJ644 was made at the C14 plot at Stine Farm. A total of 816.53 uci of C14 was applied.

Regards,

Tom

INTEROFFICE MEMORANDUM

Date: 05-Jun-1997 09:24am  
From: THOMAS P BLAESSER  
BLAESSTP  
Dept: AG ES S250 Greenhouse  
Tel No: 451-0840

TO: NORM HENRY ( HENRYNW )

CC: JEFF C GUSEMAN ( GUSEMAJC )

Subject: AMR 4417-97 Third Application

Norm,

On Wednesday, June 4, 1997 the third application of radiolabeled MJ644 was made at the C14 plot at Stine Farm. A total of 813.53 uci of C14 was applied.

Regards,  
Tom

INTEROFFICE MEMORANDUM

Date: 17-Jun-1997 02:04pm  
From: THOMAS P BLAESSER  
BLAESSTP  
Dept: AG ES S250 Greenhouse  
Tel No: 451-0840

TO: NORM HENRY ( HENRYNW )  
CC: JEFF C GUSEMAN ( GUSEMAJC )

Subject: AMR 4417-97 Final Application

Norm,

On Tuesday, June 17, 1997 the final application of radiolabeled MJ644 was made at the 14C plot at Stine Farm. A total of 813.53uci of 14c was applied. The remaining cabbage plants and pots will remain in the 14C plot until late July 1997. If you have any questions please let me know.

Regards,

Tom

INTEROFFICE MEMORANDUM

Date: 27-May-1997 01:13pm  
From: THOMAS P BLAESSER  
BLAESSTP  
Dept: AG ES S250 Greenhouse  
Tel No: 451-0840

TO: NORM HENRY

CC: JEFF C GUSEMAN

Subject: AMR4604-97 Initial Application

( HENRYNW )

( GUSEMAJC )

orm,  
On Friday, May 23, 1997 the initial application of  
radiolabeled TY029 was made to the soil surface of 26 - 5 gallon  
pots in the C14 plot at Stine Farm. A total of 108.4uci was  
applied. There will be three additional applications at a later  
date. If you have any questions please let me know.

Regards,  
Tom

*TERMINATED*

INTEROFFICE MEMORANDUM

Date: 20-Jun-1997 08:20am  
From: THOMAS P BLAESSER  
BLAESSTP  
Dept: AG ES S250 Greenhouse  
Tel No: 451-0840

TO: NORM HENRY

( HENRYNW )

CC: JEFF C GUSEMAN

( GUSEMAJC )

Subject: AMR 4576-97 Initial Application

Norm,

On Thursday, June 19, 1997 an application of radiolabeled TY029 was made to the soil surface of 36 five gallon pots in the 14C plot at Stine Farm. A total of 151 uci was applied. There will be two additional applications at approximately 30 day intervals. I will notify you when these applications are made.

Regards,

Tom

INTEROFFICE MEMORANDUM

Date: 18-Jul-1997 01:02pm  
From: THOMAS P BLAESSER  
BLAESSTP  
Dept: AG ES S250 Greenhouse  
Tel No: 451-0840

TO: NORM HENRY

( HENRYNW )

CC: JEFF C GUSEMAN

( GUSEMAJC )

Subject: AMR 4576-97 2nd Application

Norm,

On Friday, July 18, 1997 the second application of radiolabeled TY029 was made in the 14C Plot at Stain Farm. A total of 73.9uci was applied. There will be one more application in approximately 30 days.

Regards,  
Tom

INTEROFFICE MEMORANDUM

Date: 07-May-1997 12:34pm  
From: THOMAS R TAYLOR  
TRTAYLOR  
Dept: Ag Products Department  
Tel No: 695-3564

TO: NORM HENRY

( HENRYNW )

CC: GEORGE C FOX JR

( FOXGC )

Subject: Stine C14 Plot

Norm,

On Wednesday, May 7, 1997, 302 uci of C14 material was transported from the Experimental Station to the Stine C14 Plot. 292 uci of the material was applied to lettuce and approximately 10 uci of unused material was returned to the Experimental Station along with 2 uci of treated foliage.

So approximately 290 uci of C14 material remains on the lettuce in the C14 plot.

Tom Taylor  
E253 Greenhouse  
695-3564

INTEROFFICE MEMORANDUM

Date: 22-May-1997 12:15pm  
From: THOMAS R TAYLOR  
TRTAYLOR  
Dept: Ag Products Department  
Tel No: 695-3564

TO: GEORGE C FOX JR  
TO: MOTUPALLI V NAIDU  
TO: NORM HENRY

( FOXGC )  
( NAIDUMV )  
( HENRYNW )

Subject: AMR# 4375-97

Norm,

On Thursday, May 22, 1997, 302 uci of C14 DPX-T3217 was delivered to the Stine Farm C14 plot where it was formulated and 292 uci of it was applied to the lettuce in George Fox's Cymoxanil Lettuce Metabolism Study.

After the application dried on the lettuce, samples were taken and 2 uci of C14 material on the foliage samples was brought back to the Experimental Station along with 10 uci of unused material. About 290 uci remains on the lettuce crop in the field plot at Stine.

This was the second application to the lettuce crop, with the third and final application scheduled for Thursday, June 5th.

Tom Taylor  
E253 Greenhouse

INTEROFFICE MEMORANDUM

Date: 17-Jun-1997 12:57pm  
From: THOMAS R TAYLOR  
TRTAYLOR  
Dept: Ag Products Department  
Tel No: 695-3564

TO: NORM HENRY ( HENRYNW )  
TO: GEORGE C FOX JR ( FOXGC )  
TO: JEFF C GUSEMAN ( GUSEMAJC )

Subject: Stine C14 plot

Gentlemen,

On Tuesday, June 17, 1997, 302 uci of C14 material was transported from the Experimental Station to the Stine C14 field plot where 292 uci of it was applied to George Foxs' lettuce crop. It was the third application to the lettuce which is from his Cymoxanil Lettuce metabolism study AMR# 4375-97.

Ten uci of material was brought back in solution and approximately 2 uci of material from a lettuce sampling. That left 290 uci on radioactive material on the lettuce remaining in the C14 plot.

Tom Taylor  
E253 Greenhouse

INTEROFFICE MEMORANDUM

Date: 30-Jul-1996 12:32pm  
From: JEFF C GUSEMAN  
GUSEMAJC  
Dept: AG PROD EXSTA E253  
Tel No: (302) 695-9145 FAX (302) 695-4296

TO: NORMAN W HENRY

( HENRY AT A1 AT HSKVAX )

Subject: Stine Farm 14C Plot

Norm,

On Monday July 22, Harry Strek applied the following in two macrobins located in the 14C plot at Stine Farm.

AMR 4005-96, KZ165

Bin 1, TF-KZ165, 518.92uCi's.

Bin 2, TZP-KZ165, 533.90uCi's.

This will be the only application for the study.

Jeff C. Guseman

INTEROFFICE MEMORANDUM

Date: 23-Jul-1996 09:51am  
From: HARRY J STREK  
STREK  
Dept: AG - DU PONT EXP STN  
Tel No: 302-695-9476

TO: Distribution List

Subject: Signs for two macrobins in radioactive plot

Thanks for your invaluable help yesterday. We really appreciate your dropping everything and being flexible during the rescheduled application.

The signs for the two treated macrobins should read as follows:

For the one labelled "KZ165 Lot 467", the label should read "TF-KZ165 / trt 22 Jul 96 / 500 uCi 14C".

For the one labelled "KZ165 Lot 470", the label should read "TZP-KZ165 / trt 22 Jul 96 / 500 uCi 14C".

For the second sampling, we'll plan for Friday and have Monday as a backup date. I'll be doing the second one by myself. Please expect me at 0730 h.

Thanks,

Harry

*From Front  
Joe Viskolci*

INTEROFFICE MEMORANDUM

Date: 09-Sep-1996 09:39am  
From: JEFF C GUSEMAN  
GUSEMAJC  
Dept: AG PROD EXSTA E253  
Tel No: (302)695-9145 FAX (302)695-4296

TO: NORMAN W HENRY

( HENRY AT A1 AT HSKVAX )

Subject: 14c Applications Stine

Norm,

On Tuesday, 8/27/96 I applied the following at the Stine 14c plot.  
T3217 Cymoxanil, AMR 3780-96 on Tomatoes, (1) 2.5'x4' plot, 826uCi's.

This was the third and final application for this study.

On Thursday, 8/29/96 I applied the following to a designated area in the grape plots behind the E250 greenhouse at Stine Farm.

DPX KZ165, AMR 3960-96 on Grapes, (2) vines, 666uCi's each.

DPX KQ926, AMR 3946-96 on Grapes, (1) vine, 333uCi's.

Note: previous memo dated 8/9/96, second application read (2) vines, should have read (1) vine.

This was the third and final application for these studies.

Jeff C. Guseman

INTEROFFICE MEMORANDUM

Date: 09-Aug-1996 11:22am  
From: JEFF C GUSEMAN  
GUSEMAJC  
Dept: AG PROD EXSTA E253  
Tel No: (302)695-9145 FAX (302)695-4296

TO: NORMAN W HENRY

( HENRY AT A1 AT HSKVAX )

Subject: 14c Applications Stine Farm

Norm,

On Monday, 8/5/96 I applied the following to a designated area in the Grape plots behind the E250 greenhouse at Stine Farm.

DPX KZ165, AMR 3960-96 on Grapes, (2) vines, 666 uCi's each.

DPX KQ926, AMR 3946-96 on Grapes, <sup>1</sup>/<sub>2</sub> vines, 333 uCi's each.

This was the second of three applications for these studies.

On Thursday, 8/8/96 I applied the following at the Stine Farm 14c plot.

T3217 Cymoxanil, AMR 3780-96 on Tomatoes, (1) 2.5'x4' plot, 826uCi's.

This was the second of three applications.

Jeff C. Guseman

T3217  
Cym - 8/8/96  
695-4296

INTEROFFICE MEMORANDUM

Date: 17-Jun-1996 07:25am  
From: THOMAS P BLAESSER  
BLAESSTP  
Dept: AG ES S250 Greenhouse  
Tel No: 451-0840

TO: NORMAN W HENRY

( HENRYNW )

CC: JEFF C GUSEMAN

( GUSEMAJC )

Subject: Radiolabeled Pots in C-14 Area

Norm,

On Friday, June 14 a total of 24 treated pots were placed on pallets in the C-14 area at Stine farm. The pots are part of a confined crop rotation study and will remain in the C-14 plot for 210 days. At this time a total of 400 uci has been applied. A second application of 400 uci will be made in 30 days. If you have any questions or concerns please let me know.

Regards,  
Tom

INTEROFFICE MEMORANDUM

Date: 26-Jun-1996 08:14am  
From: THOMAS P BLAESSER  
BLAESSTP  
Dept: AG ES S250 Greenhouse  
Tel No: 451-0840

TO: NORMAN W HENRY ( HENRYNW )

CC: JEFF C GUSEMAN ( GUSEMAJC )

Subject: Radiolabeled Pots in C-14 Area

Norm,

On Wednesday June, 19 a total of 48 treated pots were placed on pallets in the C-14 area at Stine Farm. The pots are part of a confined crop rotation study and will remain in the C-14 plot for 210 days. At this time a total of 4mci has been applied. A second application of 4mci will be made in 30 days. If you have any questions or concerns please let me know.

Regards,  
Tom

INTEROFFICE MEMORANDUM

Date: 10-Jul-1996 09:57am  
From: THOMAS P BLAESSER  
BLAESSTP  
Dept: AG ES S250 Greenhouse  
Tel No: 451-0840

TO: NORMAN W HENRY ( HENRYNW )

CC: JEFF C GUSEMAN ( GUSEMAJC )

Subject: Radiolabeled Pots in the C-14 Plot

Norm,

On Thursday, June 27 a total of 8 treated pots were placed on pallets in the C-14 plot at Stine Farm. The pots are part of a Confined Crop Rotation Study and will remain in the C-14 plot for 360 days. A total of 1.2 mci has been applied to the soil surface of these pots.

On Tuesday, July 2 a total of 48- 5 gallon pots were placed on pallets in the C-14 plot at Stine Farm. The pots are part of a Confined Crop Rotation Study and will remain in the C-14 plot for up to 120 days. A total of 1.6 mci has been applied to the soil surface of these pots.

If you have any questions or concerns please let me know.

Regards,  
Tom

INTEROFFICE MEMORANDUM

Date: 23-Jul-1996 09:50am  
From: HARRY J STREK  
STREK  
Dept: AG - DU PONT EXP STN  
Tel No: 302-695-9476

TO: Distribution List

Subject: KZ165 Macrobin Study - AMR 4005-96

After setting up to go on Friday and having to cancel because of the thunderstorms moving in, we treated the macrobins yesterday. It was also a bit risky, but the rain (more like sprinkles) held off and we were able to get the treatment in.

The first macrobin (one closest to the SW gate) was treated with 518.92 uCi of 14C-TF-KZ165 (Lot 467) suspended in 1 ml of the EC formulation blank (KZ165-37) and water.

The second macrobin was treated with 533.90 uCi of 14C-TZP-KZ165 (Lot 470) suspended in 1 ml of the EC formulation blank and water.

Both of these are yellow and are contained within the radioactive plots at Stine Research Farm, Newark, DE. Total radioactivity was confirmed through counting aliquots of the sample solution.

The blue, untreated control macrobin was treated with 1 ml of the EC formulation blank and water.

The approximate sampling schedule is as follows: just prior to treatment, just after treatment (1 h wait) - these have been done -, 5 days, 14 days, 30 days, and 60 days. We're going to shoot for Friday, with Monday as an alternate, for the 5-day sampling.

Harry

INTEROFFICE MEMORANDUM

Date: 08-Jul-1996 10:18am  
From: THOMAS P BLAESSER  
BLAESSTP  
Dept: AG ES S250 Greenhouse  
Tel No: 451-0840

TO: JEFF C GUSEMAN ( GUSEMAJC )  
CC: THOMAS P BLAESSER ( BLAESSTP )

Subject: AMR Studies in C-14 Plot

Jeff,

The following is a list of current Confined Crop Rotation studies in the C-14 plot at Stine Farm.

AMR-4029-96 - JW062, 1.6mci total radioactivity, 72 pots,  
Start Date 7/2, 120 Days, Study Dir. C. Freeman.

AMR-2614-93 - R6447, 1.2mci total radioactivity, 12 pots,  
Start Date 6/27, 360 Days, Study Dir. R.Charlton.

AMR-3979-96 - KZ165, 8.0mci total radioactivity, 48 pots,  
Start Date 6/19, 210 days, Study Dir. E. Bollin.

AMR-3980-96 - KQ926, 8.0mci total radioactivity, 24 pots,  
Start Date 6/14, 210 days, Study Dir.  
V.Gaddamidi.

If you need any other information regarding these studies let me know.

Regards,  
Tom

INTEROFFICE MEMORANDUM

Date: 24-Jun-1996 12:50pm  
From: JEFF C GUSEMAN  
GUSEMAJC  
Dept: AG PROD EXSTA E253  
Tel No: (302) 695-9145 FAX (302) 695-4296

TO: NORMAN W HENRY

( HENRY AT A1 AT HSKVAX )

Subject: 14c Plot Stine Farm

Norm,

On Friday june 21, I applied the following at the Stine Farm 14c plot,

DPX-KZ165, AMR 3868-96 on bare soil. (2) 3'x11' plots, 733uCi's each.  
DPX-KQ-926, AMR 3816-96 on Wheat, (2) 2.5'x4' plots, One 140uCi's, one 420  
uCi's.  
DPX-KZ165, AMR 3880-96 on Wheat, (2) 2.5'x4' plots, 309uCi's each.

This was the third and final application for these studies.

Jeff C. Guseman

INTEROFFICE MEMORANDUM

Date: 06-Jun-1996 07:56am  
From: JEFF C GUSEMAN  
GUSEMAJC  
Dept: AG PROD EXSTA E253  
Tel No: (302)695-9145 FAX (302)695-4296

TO: NORMAN W HENRY

( HENRY AT A1 AT HSKVAX )

Subject: 14C Plot Stine Farm

Norm,

On Wednesday June 5, I applied the following at the Stine Farm 14c plot,

DPX-KZ165, AMR 3868-96 on bare soil, (2) 3'x11' plots, 733uCi's each.  
DPX-KQ926, AMR 3816-96 on Wheat, (2) 2.5'x4' plots, one 140uCi's, one 420uCi's.  
DPX-KZ165, AMR 3880-96 on Wheat, (2) 2.5'x4' plots, 309uCi's each.

This was the second of three applications, the final application will be in about two weeks.

Jeff C. Guseman

INTEROFFICE MEMORANDUM

Date: 29-May-1996 09:07am  
From: JEFF C GUSEMAN  
GUSEMAJC  
Dept: AG PROD EXSTA E253  
Tel No: (302)695-9145 FAX (302)695-4296

TO: NORMAN W HENRY

( HENRY AT A1 AT HSKVAX )

Subject: 14C Plot Stine Farm

Norm,

On Thursday May 23, I applied the following at the Stine Farm 14c plot,

DPX-KZ165, AMR 3868-96 on bare soil, (2) 3'x11' plots, 733uCi's each.  
DPX-KQ926, AMR 3816-96 on Wheat, (2) 2.5'x4' plots, one 140uCi's, one 420uCi's.  
DPX-KZ165, AMR 3880-96 on Wheat, (2) 2.5'x4' plots, 309uCi's each.

This was the first of three applications for each plot.

Jeff C. Guseman

INTEROFFICE MEMORANDUM

Date: 08-Jul-1996 08:13am  
From: JEFF C GUSEMAN  
GUSEMAJC  
Dept: AG PROD EXSTA'E253  
Tel No: (302)695-9145 FAX (302)695-4296

TO: NORMAN W HENRY

( HENRY AT A1 AT HSKVAX )

Subject: 14c Plot Stine Farm

Norm,

On Friday june 21, I applied the following at the Stine Farm 14c plot,

DPX-KZ165, AMR 3868-96 on bare soil. (2) 3'x11' plots, 733uCi's each.  
DPX-KQ-926, AMR 3816-96 on Wheat, (2) 2.5'x4' plots, One 140uCi's, one 420  
uCi's.  
DPX-KZ165, AMR 3880-96 on Wheat, (2) 2.5'x4' plots, 309uCi's each.

This was the third and final application for these studies.

Jeff C. Guseman

INTEROFFICE MEMORANDUM

Date: 29-Jul-1996 02:21pm  
From: JEFF C GUSEMAN  
GUSEMAJC  
Dept: AG PROD EXSTA E253  
Tel No: (302)695-9145 FAX (302)695-4296

TO: NORMAN W HENRY

( HENRY AT A1 AT HSKVAX )

Subject: 14C PLOT STINE FARM

Norm,

On Wednesday July 24, I applied the following at the Stine Farm 14c Plot,

T3217 Cymoxanil, AMR 3780-96 on Tomatoes, (1) 2.5'x4' plot, 826uCi's.

This was the first of three applications for this study.

Jeff C. Guseman

INTEROFFICE MEMORANDUM

Date: 28-Jun-1996 12:53pm  
From: JEFF C GUSEMAN  
GUSEMAJC  
Dept: AG PROD EXSTA E253  
Tel No: (302)695-9145 FAX (302)695-4296

TO: NORMAN W HENRY

( HENRY AT A1 AT HSKVAX )

Subject: 14c Application Stine Farm

Norm,

On Thursday, 6/27/96 I applied the following to a designated area in the Grape plots behind the 250 greenhouse at Stine Farm.

The area consisted of three grape vines which I enclosed with fence, labeled with radioactive signs and delineated using 2"x6"lumber to a area of 4'x8' around each grape vine.

DPX KZ165, AMR 3960-96 on Grapes, (2) vines, 666 uCi's each.

DPX KQ926, AMR 3946-96 on Grapes, (1) vine, 333 uCi's.

This was the first of three applications for these studies.

Jeff C. Guseman

INTEROFFICE MEMORANDUM

Date: 10-May-1995 12:33pm  
From: Richard D. Anderson  
ANDERSRD  
Dept: ACD  
Tel No: 695-9685

TO: NORMAN W HENRY

( HENRY AT A1 AT HSKVAX )

Subject: 14C Plot Stine Farm

Norman,

Per our telephone conversation on May 9; I am providing a list of active studies at our 14C plot, as of this date.

- 1) AMR# 3036-95: 12 Treated 5 gallon pots; 406 uCi.
- 2) AMR# 2496-92: 2 - 3' x 11' plots; 100 uCi.

Richard D. Anderson

**INTEROFFICE MEMORANDUM**

**Date:** 11-May-1995 04:07pm  
**From:** AUGUSTO A CORDOVA  
CORDOVA  
**Dept:** DuPont Facilities Services (DFS)  
**Tel No:** 695-2737 (Digital Pager:884-1156)

**TO:** Steven F. McEuen ( MCEUENSF )  
**TO:** RAYMOND E MCDEVITT ( MCDEVITT )  
**CC:** RICHARD D ANDERSON ( ANDERSRD )  
**CC:** DEBORAH H TANDARICH ( TANDARDH )  
**CC:** LAWRENCE M ORANZI ( ORANZI )

**Subject:** Material Transfers to Stine Farm Plots

Steve and Ray,

Please let Norm Henry, Stine-Haskell RSO, know when you approve transfers of radioactive material to Stine Farms for use under the Experimental Station license. An e-mail notice would suffice. Please contact Norm directly if you have any questions.

Gus

**INTEROFFICE MEMORANDUM**

**Date:** 24-May-1995 08:31am  
**From:** Richard D. Anderson  
ANDERSRD  
**Dept:** ACD  
**Tel No:** 695-9685

**TO:** NORMAN W HENRY

( HENRY AT A1 AT HSKVAX )

**Subject:** 14C Material

Norman,

I will be applying 140 uCi of 14C material tomorrow. This is for a JW062 lettuce Metabolism study. This will bring the total amount of 14C material to approximately 800 uCi, in the 14C plot.

Rich Anderson

**INTEROFFICE MEMORANDUM**

**Date:** 31-May-1995 10:37am  
**From:** BRUCE M III HASHINGER  
HASHING  
**Dept:** APD  
**Tel No:** 695-1062

**TO:** NORMAN W HENRY ( HENRY AT A1 AT HSKVAX )  
**CC:** RICHARD D ANDERSON ( ANDERSRD )  
**CC:** THOMAS R TAYLOR ( TRTAYLOR )  
**CC:** CHERYL A KIEFFER ( KIEFFECA )

**Subject:** JW062 14C SPRAY

Norman,

On June 1, 1995, Tom Taylor and I will be spraying lettuce plants in the 14C plot area with 140 uCi of JW062 labeled insecticide.

Bruce

**INTEROFFICE MEMORANDUM**

**Date:** 01-Aug-1995 12:06pm  
**From:** Richard D. Anderson  
ANDERSRD  
**Dept:** ACD  
**Tel No:** 695-9685

**TO:** NORMAN W HENRY

( HENRY AT A1 AT HSKVAX )

**Subject:** 14C Plot

Norm,

I applied 150 uCi's to the JW062 Tomato Metabolism Study, AMR# 3561-95. This was the fourth and final spray and study termination should be mid-August.

Rich Anderson

**INTEROFFICE MEMORANDUM**

**Date:** 16-Aug-1995 11:59am  
**From:** Richard D. Anderson  
ANDERSRD  
**Dept:** ACD  
**Tel No:** 695-9685

**TO:** NORMAN W HENRY

( HENRY AT A1 AT HSKVAX )

**Subject:** 14C plot

Norm,

I applied 3600 uCi's (total) to six - 5 gallon pots with grape vines for AMR# 3511-95.

Richard D. Anderson

**INTEROFFICE MEMORANDUM**

**Date:** 29-Sep-1995 01:30pm  
**From:** Richard D. Anderson  
ANDERSRD  
**Dept:** ACD  
**Tel No:** 695-9685

**TO:** NORMAN W HENRY

( HENRY AT A1 AT HSKVAX )

**Subject:** 14C plot

Norm,

On 29/Sep/95, I applied 341.6 uCi of 14C-JW062 to 6 pots of potatoes. This was for AMR# 3457-95. There will be one more application (probably next week) this year.

Richard D. Anderson

**INTEROFFICE MEMORANDUM**

**Date:** 02-Jun-1995 08:36am  
**From:** Richard D. Anderson  
ANDERSRD  
**Dept:** ACD  
**Tel No:** 695-9685

**TO:** Distribution List

**Subject:** RE: 6/1/95 C-14 Application AMR-3331-95 (Terbacil)

Norm,

A total of 2.7 mCi was applied for the Blueberry Metabolism study.

Rich Anderson

**INTEROFFICE MEMORANDUM**

**Date:** 06-Jun-1995 04:22pm  
**From:** Richard D. Anderson  
ANDERSRD  
**Dept:** ACD  
**Tel No:** 695-9685

**TO:** NORMAN W HENRY

( HENRY AT A1 AT HSKVAX )

**Subject:** 14C plot

Norm,

On June 6, I applied 300 uCi's to 5 - 10 gallon pots for a Curzate Metabolism Study.

Thank you,  
Rich Anderson

**INTEROFFICE MEMORANDUM**

**Date:** 08-Jun-1995 12:58pm  
**From:** Richard D. Anderson  
ANDERSRD  
**Dept:** ACD  
**Tel No:** 695-9685

**TO:** NORMAN W HENRY

( HENRY AT A1 AT HSKVAX )

**Subject:** 14C plot

Norm,

I applied 140 uCi's of 14C to 4 - 5 gallon pots of lettuce today.

Richard Anderson

INTEROFFICE MEMORANDUM

Date: 16-Jun-1995 01:58pm  
From: Richard D. Anderson  
ANDERSRD  
Dept: ACD  
Tel No: 695-9685

TO: NORMAN W HENRY ( HENRY AT A1 AT HSKVAX )  
CC: JOHN M BRISBIN ( BRISBINJ )  
Subject: 14C plot

Norm,

On June 16, 3.5 mCi's was applied to to grape vines, AMR# 3511-95. A 3' in diameter area around each vine was treated; plastic landscape material was used to delineate the plots and control lateral water movement. This study will be terminated in approximately 90 days at which time the vines and all contaminated soil will be removed for incineration.

Richard D. Anderson

**INTEROFFICE MEMORANDUM**

**Date:** 10-Jul-1995 10:15am  
**From:** Richard D. Anderson  
ANDERSRD  
**Dept:** ACD  
**Tel No:** 695-9685

**TO:** NORMAN W HENRY

( HENRY AT A1 AT HSKVAX )

**Subject:** 14C plot

Norm,

On July 8, 150 uCi of 14C-JW062, AMR# 3561-95, was applied to one 2.5' x 4' plot of tomatoes. There will be a total of 4 sprays, for a total of 600 uCi's. There is a total of 7,740 uCi's in the plot as of this date.

Rich Anderson

INTEROFFICE MEMORANDUM

Date: 17-Jul-1995 10:51am  
From: Richard D. Anderson  
ANDERSRD  
Dept: ACD  
Tel No: 695-9685

TO: NORMAN W HENRY

( HENRY AT A1 AT HSKVAX )

Subject: 14C plot

Norm,

On July 14, three applications of 14C material was made:

- 1) JW062 Field Soil Dissipation, AMR# 3400-95 6.18 mCi  
o 2 - 3' x 12.4' bare soil plots (3.09 mCi each).
- 2) JW062 Extraction Efficiency, AMR# 3320-95 381.3 uCi  
o 6 - 10 gallon pots of sweetcorn.
- 3) JW062 Tomato Metabolism, AMR 3561-95 150 uCi  
o 2 - 2.5' x 4' plots of tomato  
o application #2 of 4 (150 uci each)

There is a total of 14,451.3 uCi of 14C material in the plot.

Richard D. Anderson

INTEROFFICE MEMORANDUM

Date: 28-Jul-1995 12:13pm  
From: Richard D. Anderson  
ANDERSRD  
Dept: ACD  
Tel No: 695-9685

TO: NORMAN W HENRY

( HENRY AT A1 AT HSKVAX )

Subject: 14C Plot Stine Farm

Norm,

Today (7/28), I applied 178 uCi of 14C-DPX-KY422 to tomatoes in a 2.5' x 4' plot, inside the 14C plot. This is a Non-GLP metabolism Study with a second spray of 178 uCi's to be applied on 8/4.

Richard D. Anderson

**INTEROFFICE MEMORANDUM**

**Date:** 07-Aug-1995 09:35am  
**From:** Richard D. Anderson  
ANDERSRD  
**Dept:** ACD  
**Tel No:** 695-9685

**TO:** NORMAN W HENRY

( HENRY AT A1 AT HSKVAX )

**Subject:** 14C Plot

Norm,

On Friday, August 4, 178 uCi's of 14C-DPX-KY422 was applied to tomatoes. This was the second of two applications on this plot.

Richard D. Anderson

**INTEROFFICE MEMORANDUM**

**Date:** 22-Jun-1995 06:53am  
**From:** Richard D. Anderson  
ANDERSRD  
**Dept:** ACD  
**Tel No:** 695-9685

**TO:** NORMAN W HENRY ( HENRY AT A1 AT HSKVAX )  
**CC:** SUSAN M HAUSMANN ( HAUSMASM )  
**Subject:** 14C plot Stine Farm

Norm,

On June 21, approximately 600 uCi of radioactive material was applied to 4 pots of potatoes (AMR# 3408-95), at Stine Farm. This study terminates on June 24; at which time all materials will be returned to the Experimental Station.

Richard D. Anderson

**INTEROFFICE MEMORANDUM**

**Date:** 08-Sep-1995 11:32am  
**From:** Richard D. Anderson  
ANDERSRD  
**Dept:** ACD  
**Tel No:** 695-9685

**TO:** NORMAN W HENRY

( HENRY AT A1 AT HSKVAX )

**Subject:** 14C Plot

Norm,

On September 8, I applied 360 uCi's to 6 - 10 gallon pots of potatoes. This was in support of 14C-T3217 Potato Metabolism Study, AMR# 3575-95.

Richard D. Anderson

**INTEROFFICE MEMORANDUM**

**Date:** 30-Aug-1995 09:37am  
**From:** Richard D. Anderson  
ANDERSRD  
**Dept:** ACD  
**Tel No:** 695-9685

**TO:** NORMAN W HENRY

( HENRY AT A1 AT HSKVAX )

**Subject:** 14C Plot

Norm,

On August 29, 1995, 2946 uCi's (total) were applied to 27-5 gallon pots at Stine Farm. This was for DPX-T3217 Crop Rotation, AMR# 3575-95. These pots will be aged in the field and periodically taken back to the 253/GH where they will be planted with crops.

Richard D. Anderson

INTEROFFICE MEMORANDUM

Date: 09-Oct-1995 06:49am  
From: Richard D. Anderson  
ANDERSRD  
Dept: ACD  
Tel No: 695-9685

*RSO - Stone Farm*  
✓

TO: NORMAN W HENRY

( HENRY AT A1 AT HSKVAX )

Subject: 14C plot

Norm,

I applied 300 uCi's to 4 pots of potatoes on 6/Oct/95. This was the last application for this year.

Rich Anderson

INTEROFFICE MEMORANDUM

Date: 01-Jun-1994 09:39am  
From: Richard D. Anderson  
ANDERSRD  
Dept: ACD  
Tel No: 695-9685

TO: EDWARD C SOWDEN, II

( SOWDENEC )

Subject: Grape Plots

Duke,  
The soil cores from the Grape plots are back. This area is released back to you, see results below:

Plot 1 46 dpm/g soil  
Plot 2 32 dpm/g soil  
Plot 3 8 dpm/g soil  
Plot 4 5 dpm/g soil

These results are well below the 1760 dpm/g soil limit for decommissioning.

Thank you,  
Richard D. Anderson

INTEROFFICE MEMORANDUM

Date: 31-Mar-1994 02:15pm  
From: Richard D. Anderson  
ANDERSRD  
Dept: ACD  
Tel No: 695-9685

TO: DEBORAH H TANDARICH ( TANDARDH )

CC: JEFFREY J ANDERSON ( JANDERSO )

Subject: Radioactive Materials Licenses

Deb,

In case we run into a situation where you need me I've asked Jeff Anderson, my supervisor, to be my official "back-up" for the times I am unavailable. Jeff will have access to my notebooks and files but, will not know about day to day operations. I believe my files are organized enough that an auditor could get most, if not all, the information He/She was looking for. If questions were to arise, I could address them at a later date.

Jeff's location: 402/5257  
phone No. x 5-1256.

Field site locations with 14C licenses: Rochelle, Ill., Greenville, Miss., Donna, Tex., Bradenton, Fla., Madera, Cal., and Stine Farm. All farms, except Stine, are individually license through the respective state agencies.

I hope your audit went smooth.

Rich Anderson