4 January, 2011

Licensing Group
United States Nuclear Regulatory Commission
Region III
801 Warrenville Road
Lisle, IL 60532-4351

Dear Sir/Madam:

The following is an amendment request for Dow-Corning Corporation, DC-3 facility, **license # 21-08362-08.** This is to request a change in our Radiation Safety Officer (RSO) and Assistant Radiation Safety Officer. Mr. Paul S. Larson will be switching from the Assistant RSO role to the RSO role and Dr. Vinita Pandit will become the new Assistant RSO. Mr. Larson has worked for Dow Corning for several years and has worked with radioactive materials during that time; he has been the Assistant RSO since 2008 and was previously the RSO in DC-3 from 1998 to 2008. Dr. Pandit has received additional training in radiation protection to better prepare her for the role of Assistant RSO and has been the authorized user in the Synthesis lab since March 2010. Dr. Pandit attended a 3 day radiation safety course offered by Engelhardt & Associates, Inc., February 2010. This course has also been approved previously by the NRC and Agreement States. A copy of the Mr. Larson's and Dr. Pandit's training is attached with the amendment request.

Your expeditious response to this request is appreciated. Thank you. If you have questions please feel free to contact our current RSO, Mr. Jeremy Durham at 989-496-3182.

Sincerely,

Debra A. McNett

Debra A. McNett
Radiation Safety Committee Chairperson
Dow Corning Corporation

NRC FORM 313 U.S. NUCLEAR REGULATORY COMMISSION
(3-2009)
10 CFR 30, 32, 33, 34, 35, 36, 39, and 40

APPLICATION FOR MATERIALS LICENSE

APPROVED BY OMB: NO. 3150-0120 EXPIRES: 3/31/2012

Estimated burden per response to comply with this mandatory collection request: 4.3 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 and FOIA/Privacy Services Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects.resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0120), 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:

OFFICE OF FEDERAL & STATE MATERIALS AND
ENVIRONMENTAL MANAGEMENT PROGRAMS
DIVISION OF MATERIALS SAFETY AND STATE AGREEMENTS
U.S. NUCLEAR REGULATORY COMMISSION
WASHINGTON, DC 20555-0001

ALL OTHER PERSONS FILE APPLICATIONS AS FOLLOWS:

IF YOU ARE LOCATED IN:

ALABAMA, CONNECTICUT, DELAWARE, DISTRICT OF COLUMBIA, FLORIDA, GEORGIA, KENTUCKY, MAINE, MARYLAND, MASSACHUSETTS, NEW HAMPSHIRE, NEW JERSEY, NEW YORK, NORTH CAROLINA, PENNSYLVANIA, PUERTO RICO, RHODE ISLAND, SOUTH CAROLINA, TENNESSEE, VERMONT, VIRGINIA, VIRGIN ISLANDS, OR WEST VIRGINIA, SEND APPLICATIONS TO:

LICENSING ASSISTANCE TEAM
DIVISION OF NUCLEAR MATERIALS SAFETY
U.S. NUCLEAR REGULATORY COMMISSION, REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PA 19406-1415

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
2443 WARRENVILLE ROAD, SUITE 210
LISLE, IL 60532-4352

ALASKA, ARIZONA, ARKANSAS, CALIFORNIA, COLORADO, HAWAII, IDAHO, KANSAS, LOUISIANA, MISSISSIPPI, 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 BRANCH
U.S. NUCLEAR REGULATORY COMMISSION, REGION IV
612 E. LAMAR BOULEVARD, SUITE 400
ARLINGTON, TX 76011-4125

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 21-08362-08
- ☐ C. RENEWAL OF LICENSE NUMBER

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

Dow Corning Corporation
2200 West Salzburg Road
Auburn MI 48611

3. ADDRESS WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED

Dow Corning Corporation
2200 West Salzburg Road
Auburn MI 48611

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

Jeremy A. Durham, RSO

TELEPHONE NUMBER

(989) 832-4486

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	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.

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	SIGNATURE	DATE
Debra A. McNett, Manager of Chemistry	Debra A. McNett	Jan 4, 2011

FOR NRC USE ONLY

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

Written Radiation Safety Program
Health & Environmental Science Laboratory
Dow Corning Corporation

Approvals:

Debra A. McNett
RSC Chairperson
Manager – Chemistry

June 29, 2010
Date

Jeremy A. Durham
Radiation Safety Officer

June 29 2010
Date

PURPOSE

It is required by the Nuclear Regulatory Commission (NRC) that each licensee develop, document and implement a radiation protection program that accurately reflects both the license and the regulations as set forth in 10 CFR Part 19 and 10 CFR Part 20. The following is the written Radiation Safety Program for the Dow Corning Health & Environmental Sciences Laboratory, NRC license # 21-08362-08, expiring on May 31, 2012. The current Radiation Safety Committee (RSC) chairperson and the acting site Radiation Safety Officer (RSO) approve this document. Any changes to this document are to be approved by the RSC chairperson and RSO.

SCOPE OF THE LICENSE

Our NRC materials license is a Type A specific license of broadscope authorizing receipt, acquisition, ownership, possession, use, and transfer of any chemical or physical form of byproduct material specified in the license, but not exceeding quantities specified in the license, for research and development activities as authorized. The license allows for the RSC to approve new rooms, new users and new procedures, within the scope of the license, as defined in sections 9A-G of the license and as set forth in any amendments or supporting documents referenced in the license.

RADIOACTIVE MATERIALS AUTHORIZED BY THE LICENSE

^{14}C	Any form	3	Ci
^{3}H	Any form	200	mCi
^{51}Cr	Any form	200	mCi
^{32}P	Any form	50	mCi
^{125}I	Prepackaged kits	10	mCi
^{35}S	Any form	50	mCi

RADIATION SAFETY COMMITTEE

Dow Corning has a Radiation Safety Committee (RSC), which will consist of the RSC chair, the RSO and/or the assistant RSO, and individuals representing Management and the Science Research and Development Staff. One of the representatives will be assigned the responsibilities of chairperson. The RSO, assistant RSO and committee chairperson are to be named in the current NRC license.

The following list of members defines a quorum for this committee: RSC chairperson, the RSO and/or assistant RSO at a minimum. Based on specific issues and/or discussion, trained radiation workers from areas of use or representatives whose field of expertise is necessary will attend.

PERSONNEL AND TRAINING

Authorized Users: Only persons specifically authorized by the RSC can supervise the use of radioactive materials by others. The RSC must retain a list of these authorized persons for a period of three years. Before the RSC can approve a new authorized user, this individual must have a college degree at the bachelor level, or equivalent training and experience, in the physical or biological sciences or in engineering; and at least 40 hours of training and experience in the safe handling of radioactive materials, and in the characteristics of ionizing radiation, units of radiation dose and quantities, radiation detection instrumentation, and biological hazards of exposure to radiation appropriate to the type and forms of byproduct material to be used.

Radiation Worker: Other personnel can use radioactive materials under the supervision of an authorized user if the individual has had training in the principles of radiation protection, hands on laboratory training and has reviewed the Dow Corning radiation safety procedures.

Ancillary Staff: Personnel frequenting a posted area, shall be trained in the basics of radiation protection, legal issues, personnel protective apparel requirements, worker rights, and what the various signs and labels mean.

On an annual basis, all authorized users and radiation workers that are covered by the NRC license shall receive refresher training. The content of this training is commensurate with the duties the individual performs. Training records shall be kept by the Radiation Safety Officer and are to be in a readily auditable form. It is acceptable for training records to be maintained as part of an employee's GLP training file.

LABORATORY FACILITIES AND EQUIPMENT

The primary location of use is the Health and Environmental Sciences Laboratory (DC3) at 2200 W. Salzburg Road, Auburn, MI. However, the RSC can approve use of radioactive materials at any laboratory facility located on the Dow Corning Corporate Center site (2200 W. Salzburg Rd, Auburn, MI).

Facilities: The RSC must approve all facilities where radioactive materials are used or stored. In order for a radioactive material use laboratory to be approved, the RSC must review the appropriateness of the laboratory. At a minimum, a radioactive material use lab shall meet the following criteria:

- Fume hoods: Present if there is any potential for volatile radionuclides (flow = minimum of 80-100 fpm with sash opening specified).
- Work surfaces: Benches shall be either of a non-porous material or shall be covered with absorbent paper.
- Laboratory sinks: A sink shall be present in or adjacent to the laboratory, if there is any potential for liquid spills; a sink must be available for personnel to wash with prior to leaving the restricted area.

- Storage units (Refrigerators/freezers, waste storage containers, etc.): Shall be evaluated by the RSC for suitability before being used to store radioactive material.
- Ventilation: Verification that the lab is negative pressure to the hallway shall be done at least annually or whenever there is work performed on the ventilation system that could affect airflow through this area.

Survey Equipment: Appropriate radiation detection equipment must be available, such as Liquid/Solid Scintillation analyzers, Gamma Counters and/or GM counters that are at least the equivalent of a Ludlum Model 3.

AUDITS OF THE RADIATION SAFETY PROGRAM

The RSO or assistant RSO will accompany a member of the Radiation Safety Committee in conducting an audit of the radiation safety program on a quarterly basis. This audit is a review of licensed activities and may not be totally inclusive of all items on the license but typically involves review of laboratory inventories, survey records and general facility conditions. These audit findings are reported to the RSC.

At least annually, an audit of the entire radiation safety program will be conducted. These results are to be reported to management responsible for the radiation safety program.

LABELING

Containers of licensed material shall be labeled in accordance with the NRC regulations:
Part 20 Appendix C Quantities:

Radionuclide	Quantity (mCi)
Hydrogen-3	1.000
Carbon-14	0.100
Phosporus-32	0.010
Iodine-125	0.001
Chromium-51	1.000
Sulfur-35	0.100

Each container of licensed material in quantities ≥ the quantities listed above, bears a durable, clearly visible label bearing the radiation symbol and the words "Caution, Radioactive Material" or "Danger, Radioactive Material." However, if the individual vial is too small, a secondary container holding the vial will be labeled appropriately. The label must also provide sufficient information, such as, the radionuclide(s) present, an estimate of the quantity of radioactivity, the date for which the activity is estimated, and radiation levels (if applicable) to permit individuals handling or using the containers, or working in the vicinity of the containers, to take precautions to avoid or minimize exposures. Also included on the label are the chemical name, inventory number and/or lot

number, and the initials of the person who dispensed the material into the container.

Any containers and/or box(es) of licensed material below these limits in 10 CFR Part 20 Appendix C will, at a minimum, bear a durable, clearly visible label bearing the radiation symbol and sufficient detail to identify the radionuclide and material present in the container.

Prior to removal or disposal of empty uncontaminated containers to unrestricted areas, remove or deface the radioactive material label or otherwise clearly indicate that the container no longer contains radioactive material.

POSTING

All areas shall be posted in accordance with the NRC regulations:

"CAUTION, RADIOACTIVE MATERIAL(S)" or "DANGER, RADIOACTIVE MATERIAL(S)" signs shall be posted in each laboratory or area wherever radioactive materials are used or stored in quantities exceeding 10 times the quantity of such material specified in appendix C to part 20 (see above).

"CAUTION, RADIATION AREA" signs shall be posted for an area or laboratory, accessible to individuals, in which radiation levels could result in an individual receiving a dose equivalent in excess of 5 mrem but ≤ 100 mrem (0.05 mSv but ≤ 1 mSv) in 1 hour at 30 centimeters from the radiation source or from any surface that the radiation penetrates.

NRC FORM 3: This is conspicuously posted in areas where employees are likely to see them. A "Notice to Employees" describing the location and availability of the NRC License, other documents specifically identified in section 16 of the license, the Written Radiation Safety Program, CFR Title 10 Part 19 Notifications and 10 CFR Part 20 Standards is also conspicuously posted in areas where employees are likely to see them. In addition, NRC FORM 3 and the "Notice to Employees" are posted at the entrance to the building.

Inspections: When an inspection by the NRC is conducted, any notice of violation involving radiological working conditions, proposed imposition of civil penalty, or order issued pursuant to subpart B of part 2 Title 10, and any response from the licensee will be posted alongside NRC FORM 3. Such documents will remain posted for a minimum of 5 working days or until action correcting the violation has been completed, whichever is later.

SECURITY

Radioactive materials are secured at all times against unauthorized removal from the HES facility. There are locks on the doors to the buildings and key-card access to various areas of the building. All stocks of radioactive materials (original containers which are maintained in the central storage area by the RSO/Assistant RSO) are secured in a locked refrigerator/freezer.

INSTRUMENT CALIBRATIONS

Survey meters shall be calibrated annually by the manufacturer, or other individuals licensed to perform calibrations. In addition, meters shall be calibrated whenever repair is performed on the meter.

ORDERING RADIOACTIVE MATERIALS

License Condition and Objective: All orders for radioactive materials will be placed through the RSO and/or assistant RSO. The RSO and/or assistant RSO must verify the inventory status before an order can be placed. This assures that the license limits will not be exceeded.

The following list is a general guideline for ordering isotopes:

- Define the need for the radioactive material (e.g. radionuclide, labeled compound, amount).
- Identify potential source.
- Request approval from RSO and/or assistant RSO.
- RSO and/or assistant RSO checks inventory and approves order.
- Approved order placed by authorized user, or designee with stipulation that radioactive material is delivered to the attention of the RSO and/or assistant RSO. Estimated arrival date is provided to the RSO and/or assistant RSO.
- Receiving personnel notified by RSO or authorized user of scheduled arrival date.

Upon receiving approval the order may be placed. All radioactive materials are to be addressed to the attention of the RSO and/or assistant RSO. The receiving department must notify the RSO and/or assistant RSO when the package marked "Radioactive" has arrived. All packages that are labeled externally as '**radioactive**' must be wipe tested and/or surveyed for radiation upon receipt. Upon receiving the radioactive material and logging it into the building inventory the RSO and/or assistant RSO may transfer the material as required.

Requests and notifications are preferred via electronic mail. A hard copy of the request and approval is kept by the RSO (if available).

RECEIPT OF RADIOACTIVE MATERIALS

All radioactive materials shall be received during normal work hours (8:00 A.M. to 4:30 P.M.) and surveyed for contamination at the time of receipt. The following procedure is designed to assure surveys are conducted and the radioactive material is entered into the facility inventory in a timely fashion.

- Inspect the package for damage; if damage is suspected ask the delivery person to remain on site and notify the RSO and/or assistant RSO immediately.

- If damage to the package is apparent the delivery vehicle, receiving area and all personnel shall be surveyed for contamination.
- Appropriate Dow Corning Corporate receiving procedures are followed.
- Notify the RSO and/or assistant RSO that the package has arrived.
- Packages are transported to the DC-3 storage area by the RSO and/or assistant RSO for packages marked "Radioactive" or receiving personnel for limited quantities in excepted packaging.
- Package contents are verified against the packing slip.
- Upon receipt of a radioactive package, a survey of the package must be done as soon as practical after receipt of the package, but not later than 3 hours after the package is received (for radioactive White I, Yellow II or III labeled packages) if it is received during normal working hours, or at the beginning of the next working day if it is received after working hours. This survey consists of a wipe test and/or a meter survey.
- The RSO and/or assistant RSO shall keep records of these survey records and receipt records.
- The RSO and/or assistant RSO logs the material into the building inventory.

TRANSFER OF RADIOACTIVE MATERIALS

Transfer to Another NRC/Agreement State Licensee: Transfers of radioactive materials must be done by the RSO and/or assistant RSO. Before any radioactive materials are transferred to another licensee, a copy of their NRC/Agreement State license must be on file with the RSO and/or assistant RSO at DC-3. To complete the transfer:

- Obtain a copy of the license.
- Check with the RSO at receiving institution to verify that there is room on their inventory.
- Package the radioactive material according to DOT specifications.
- Survey the external surface of the package for removable radioactive contamination by wipe testing the package and for radiation levels by using a GM counter.
- As per the Code of Federal Regulations 49 Part 173.443 Contamination control: The level of non-fixed (removable) radioactive contamination on the external surfaces of each package offered for transport must be kept as low as reasonably achievable (ALARA). The survey is performed by wiping an area of 300 cm^2 on the external surface of the package with an absorbent material, using moderate pressure, and measuring the activity on the wiping material. Sufficient measurements must be taken in the most appropriate locations to yield a representative assessment of the non-fixed contamination levels.
- The level of non-fixed (removable) radioactive contamination on the external surface of each package offered for shipment may not exceed 220 dpm/cm^2 or the radiation level does not exceed 200 mrem/Hr at any point on the external surface of the package.

- Label the package according to DOT and include the appropriate documentation.
- Ship the package according to Dow Corning Corporation practices.
- Provide a chain of custody letter documenting the transfer of isotope from the HES license.
- Remove the radioactive material quantity being shipped from the building/lab inventory.

Transfer of Radioactive Materials Between Authorized Users: This can be done with approval of the RSO and/or assistant RSO. Such transfers must be documented in the radioactive materials use records for each user. Transfer of radioactive materials must include a secondary container holding sufficient absorbent material (e.g. sawdust, paper towels, etc.) to absorb all liquids in the event of a spill.

APPLICATION FOR USE OF RADIOACTIVE MATERIALS

The Radiation Safety Committee will approve all uses of radioactive materials, rooms and authorized users of radioactive materials. To ensure currency of the program, the RSC will call for periodic renewals of all applications.

Experimental Protocols (formerly known as Use Applications):

New Experimental Protocols: This is for a new application or use of radioactive isotopes, which has not been approved by the RSC previously. This application should be submitted by an authorized user for review and approval of the RSC prior to initiating the activities.

Renewal Application: An Authorized User must submit a renewal application to the RSC whenever there are changes or at least every three years. This application should be an updated version of the original application. The intent is to maintain currency in the program with emphasis on method updates.

The required elements of an isotope experimental protocol are listed below. An authorized user may submit a description of their proposal to the RSC in a memo format or use the application forms, which can be provided by the RSO.

REQUIRED ELEMENTS OF AN ISOTOPE EXPERIMENTAL PROTOCOL

1. Experimental Overview (radionuclide, study type, test system, duration of experiments)
2. Amount of Isotope Used in Each Experiment/Procedure
3. Waste Handling and Minimization Procedures
4. Laboratory Procedures for Control of Contamination
5. Exposure Controls (Shielding, if appropriate, and ALARA efforts)
6. Personnel Low-Level Radioactive Monitoring, Dosimetry Records
7. Equipment

TYPES OF SURVEYS

There are many different types of surveys performed

- Surveys for radioactive contamination (restricted and unrestricted areas) that could be present on surface floors, walls, laboratory furniture, and equipment.
  - Fixed Contamination
  - Removable Contamination
- Water Effluent - Measurements of radioactive material concentration in water that is released to the public sanitary sewer.
- Air Effluent
- Leak Test (sealed sources)
- Bioassays

Radiation surveys are used to detect and evaluate contamination of:

- Facilities
- Equipment
- Personnel (during use, transfer, or disposal of licensed material)
- Restricted and Unrestricted Areas

Surveys are also used to evaluate doses to workers and individual members of the public.

PERSONNEL MONITORING/RADIATION DOSIMETRY AND ALARA PROGRAM

It is a requirement of the NRC that all licensees have a radiation safety program that keeps all exposures to radiation As Low As Reasonably Achievable. The maximum allowable dose for a radiation worker with a body badge is 5 rem/year. Due to the low level energy for carbon-14 and tritium a body badge is not required for C-14 and Tritium use. The maximum allowable dose for radiation worker conducting synthesis using carbon-14 labeled materials and working with larger quantities of carbon-14 (>100 mCi) is 5 rem/year; the maximum dose for a radiation worker without a body badge is 500 mrem/ year (except as stated above); a non-radiation worker can receive only 100 mrem/year. These doses are derived from both external sources of radiation exposure and internal exposures (uptakes).

Dow Corning will utilize a NVLAP certified vendor for its dosimetry program such as Landauer, Inc. of Glenwood, IL.

All laboratory personnel working in laboratories which use ^{32}P or ^{51}Cr are on a dosimetry program and shall be monitored with a body badge and ring. Body badges are to be worn on the collar, or as close to the eyes as possible. Ring badges are to be worn on the hand most likely to be exposed to radiation. Note: ring badges should be worn under disposable gloves and the label of the ring should face the palm of the hand. These badges are to be changed on a monthly basis. The badge results are reviewed when they are received from the

dosimeter supplier. Notification of employees with measurable exposures will be made in the form of electronic mail.

ALARA Limits: The following limits are investigation guides for the DC-3 facility:

0.125R/quarter	Whole body
1.25R/quarter	Extremity

For any person whose quarterly whole body dose exceeds 0.125 rem or any person whose dose exceeds 1.25 rem per quarter on a ring badge, an investigation will be done by the RSC to address work habits and reduce exposure. Any ALARA investigations will be discussed at the quarterly RSC meetings and recommendations made to reduce the dose, if appropriate.

For personnel at DC-3 that do not wear a badge, ALARA is maintained through employee training and awareness programs. Exposures of the general public are monitored with area monitors positioned throughout the laboratories to assess worst-case exposure levels.

Urine bioassays will be conducted if an accident/spill occurs on a person working with radioactive material. Also, when personnel handle amounts exceeding 100 millicuries a urine bioassay will be performed. This procedure is in place to monitor employees exposed to elevated quantities of these soft beta emitters.

To perform the bioassay,

- Obtain a urine sample approximately 24 hours after the use of material.
- Aliquot 1 ml of urine into a liquid scintillation vial. Add LSC cocktail.
- Count the sample in conjunction with a background.
- If a positive reading is obtained (greater than 200 dpm), allow the sample to stand for 24 hours and recount. (This is to eliminate any chemiluminescense problems). If a positive reading is still obtained conduct a second bioassay and repeat every 24 hours until a background reading is obtained.
- Any quantifiable exposure must be added to the individual's exposure records.

Note: For each person that has the potential of handling these quantities of ^{3}H or ^{14}C a background urine bioassay should be performed prior to beginning work. Each lab should perform their own bioassays; records of these bioassays should be retained by the RSO for audit review. If a positive reading (greater than 200 dpm) is seen on any bioassay, contact the RSO and/or assistant RSO immediately. All positive results shall be added to the badge readings, where applicable, so that the internal plus the external dose is summed.

Exposure records of doses received by all individuals for whom monitoring is required shall be maintained in accordance with the NRC regulations. An annual summary of doses (exposures) will be given to each worker for whom monitoring

was required. Additionally, if a worker so requests, a copy of their exposure history is provided within 30 days of making the request.

DECLARED PREGNANT WOMEN

For women who have signed the attached Declaration of Pregnancy form, Dow Corning will ensure that the dose to the embryo/fetus during the entire pregnancy, due to occupational exposure of the declared pregnant woman, does not exceed 0.5 rem (5 mSv). Additionally, Dow Corning will make efforts to avoid substantial variation above a uniform monthly exposure rate to a declared pregnant woman. Declared pregnant woman means a woman who has voluntarily informed Dow Corning, in writing, of her pregnancy and the estimated date of conception. After obtaining the declaration in writing, Dow Corning will take measures to limit the radiation dose to the embryo/fetus to 0.5 rem (5 mSv) during the entire pregnancy. If that dose was already exceeded in the period between conception and the declaration of pregnancy, an additional dose of 0.05 rem (5 mSv) is allowed during the remainder of the pregnancy. The declaration remains in effect until the declared pregnant woman withdraws the declaration in writing or is no longer pregnant. If the declaration is not withdrawn, the written declaration may be considered expired one year after submission. If a woman doesn't declare the pregnancy in writing, then Dow Corning is under no obligation to acknowledge the pregnancy or limit the exposure to the embryo/fetus to 0.5 rem during the entire pregnancy.

A woman, who declares a pregnancy in writing, should submit the attached form to her immediate supervisor and the RSO at DC-3. In order to meet the reduced exposure limit, the declared pregnant woman's job or job responsibilities may change for the duration of the pregnancy, without reduction in pay, benefits or opportunity for advancement. A declared pregnant woman with job responsibilities that are likely to result in radiation exposure from external sources of a deep dose equivalent in excess of 0.1 rem (1mSv) will be assigned a fetal monitor badge. The fetal monitor badge is separate from the regularly assigned badge; it is a monthly badge and must be worn over the abdomen. Records of the dose to an embryo/fetus will be kept with the records of dose to the declared pregnant woman. Questions or requests for additional information may be directed to the RSO at DC-3.

CONTAMINATION SURVEYS

Combined removable and fixed contamination should be surveyed using appropriate radiation detection equipment. Removable contamination can be detected and measured through a wipe test of the surface, which is then counted in an appropriate counting instrument, such as, a liquid scintillation analyzer. Meter surveys can also be used for the higher energy beta and gamma emitters.

Contamination surveys need to be performed:

- To evaluate radioactive contamination that could be present on surfaces of floors, walls, laboratory furniture, door handles, and equipment
- After any spill or contamination event

- To evaluate the potential contamination of users and the immediate work area, at the end of the day prior to leaving the area of use
- In areas adjacent to restricted areas and in all areas through which licensed materials are transferred

CONTAMINATION SURVEY FREQUENCIES

Areas, which house radioactive materials or locations where individuals are working with an unsealed form of radioactive material, must be surveyed for contamination.

Daily Survey (for greater than 2 mCi of ^{14}C)
To ensure that immediate work areas are not contaminated after use, the immediate work area should be surveyed using a GM counter or conducting a wipe test. The results of the survey will be documented.

Wipe Testing Schedules:
A weekly survey is required for laboratories which routinely use or store >200 μCi. Laboratories that use or store ≤200 μCi are to be surveyed on a monthly schedule.

The weekly and monthly wipe tests are a more thorough survey of areas where radioactive material are used and stored.

CONTAMINATION SURVEY PROCEDURES

General Guidelines: Wipe tests must be done in areas where soft beta emitters (^{14}C / ^{3}H) are used. Wipe tests and/or meter surveys are done where hard betas or gamma emitters (^{32}P / ^{51}Cr/^{125}I) are used. Each wipe should approximate 100 cm^2 and the action level (decontamination) is defined as 200 dpm/100 cm^2. On the average, 5-20 wipes per lab are sufficient. The survey is to be a detailed representation of the lab where the radioactive material is used with periodic sampling of areas such as doorknobs, floors, and cabinet handles, etc. On occasion, wipe test areas adjacent to restricted areas, such as office areas, floor outside the lab, etc. In areas where the activity levels occasionally exceed the 200 μCi limit it is acceptable to perform wipe tests following each such use rather than on a weekly schedule.

Wipe Test Procedure

- Moisten swab or other selected wipe material with a solvent
- Applying moderate pressure, wipe an area approximating 100 cm^2 (4" x 4")
- Place wipes for beta emitters into labeled vials, add liquid scintillation cocktail and count using a liquid scintillation counter (LSC)
- For gamma emitters, place the wipes into the gamma counter and count them
- Review the results

- For surveys exceeding the following action levels, perform the following tasks:
  - if >200 dpm/100 cm^2, decontaminate the area, re-wipe the surface, document activities
  - if >1000 dpm/100 cm^2 - notify RSO and/or assistant RSO, decontaminate the area, re-wipe the surface, document activities, notify RSO and/or assistant RSO
- If an area cannot be decontaminated, mark the area very clearly with a tag that indicates that it is contaminated
- Maintain records in an auditable format.

Procedure for Meter Surveys:

- Check that batteries are operational
- Check the Calibration date
- Check source reading is accurate
- Background reading is within range (~ 0.02-0.05 mR/hr or 200-400 cpm)
- Survey the area and record the meter readings in mR/hr or μR/hr
- If reading is greater than 0.05 mR/Hr or 400 cpm, decontaminate the area, re-survey the surface, document activities
- If there is no removable contamination but the reading is still above normal, notify the RSO and/or assistant RSO
- Maintain records in an auditable format

All survey records must be signed, dated and retained in a readily auditable form for three years. Survey records will be inspected by the RSO and/or assistant RSO as part of the quarterly inspection. Documentation and notifications (if needed) of contamination should be maintained with the survey records in the affected laboratory.

Notifications: The RSO must be notified (via electronic mail) when contamination occurs >1000 dpm/100 cm^2. When contamination cannot be removed, or the meter readings cannot be reduced, notify the RSO and/or assistant RSO immediately. If any meter reading is greater than 0.05 mR/Hr and cannot be reduced, shield the area, notify the RSO and/or assistant RSO.

SURVEY RECORD REQUIREMENTS

- Lab diagram of the area
- List of items and equipment surveyed
- Specific locations on the diagram where wipe test or survey was taken
- Ambient radiation levels with appropriate units (e.g., 20-50 μR/hr or 200-400 cpm when using a low energy gamma scintillator)
- Contamination levels with appropriate levels
- Make and model numbers of instruments used
- Background levels
- Name of the individual making the evaluation and recording the results and date

GENERAL LABORATORY SAFETY

General laboratory safety practices are to be followed:

- There will be no eating, drinking or smoking in laboratories where radioactive materials are used.
- There will also be no storage of food, drink or cosmetics in laboratories where radioactive materials are used.
- When working with unsealed radioactive material never pipette by mouth.
- Lab coats, disposable gloves, booties (if applicable) and safety glasses must be worn at all times when working with radioactive materials.
- Leave all laboratory gear in the labs when finished working with radioactive materials. DO NOT wear lab coats, booties, gloves, etc., into unrestricted areas of the building.
- When working with unsealed radioactive material (other than tritium) users should survey hands and shoes with an appropriate GM counter before leaving the lab.
- Dispose of radioactive waste only in designated, labeled and properly shielded receptacles.
- A GM counter will be used to survey lab coats and booties prior to disposal and, if any radioactive contamination is evident, dispose of as radioactive waste.
- Store radioactive solutions in clearly labeled containers
- Secure all licensed material when it is not under the constant surveillance and immediate control of the user(s)

RADIATION SAFETY PROGRAM INVENTORY CONTROL

An authorized user's primary responsibility is to ensure that radioactive materials used in his or her particular lab or areas are used safely and according to the regulatory requirements. The authorized user is also responsible to ensure that procedures and engineering controls are used to keep occupational doses and doses to members of the public ALARA.

Upon receipt of any radioactive material the authorized user is responsible for ensuring documentation of use and disposal of the material. This documentation may be kept in a laboratory notebook, by using an appropriate form or on a computer spreadsheet. In any case the following information should be available for inspection at any time:

- Chemical name including radionuclide, inventory number and/or lot number of material.
- Amount of radioactivity and date received.
- For each use, record the amount used, amount disposed and amount remaining in stock solution. For clarification, remaining stock solution is defined as chemically identical to what was received (i.e. no dilution) from

the central storage inventory. All dilutions should be considered in-use inventory.

- For waste deposits into radioactive waste fiber packs, the user needs to enter the inventory number, radionuclide/material name, volume/weight, amount of radioactivity, and initial/date the entry on the radioactive waste spreadsheet.

Authorized Users: Uses or directly supervises use of radioactive material
Supervise maintenance, use and disposal of radioactive material inventory
Update after each use
Ensure quarterly updates are provided to the RSO.

RSO and/or assistant RSO: Maintain the total building inventory for individual isotopes.
Verifies inventory as part of audits.
Identifies inactive isotope, which is to be considered by the RSC for disposal.

RADIOACTIVE WASTE MANAGEMENT

Each authorized user must describe how he/she is going to minimize production of radioactive waste as part of their application for use of radioactive materials.

^{3}H OR ^{14}C WASTES

Radioactive Laboratory Waste:

Dow Corning Waste Stream; Flammable and Low-Level Radioactive Liquids and Solids (Q8-1603C label, formerly Q8-6680 label)
General radioactive laboratory wastes (e.g. lab coats, gloves, pipets, containers, soil/sediment samples, etc.) are to be packaged into radioactive laboratory waste packs. It is acceptable to place ½ gallon flammable/radioactive and ½ gallon aqueous/radioactive materials into the waste pack provided the total weight of the pack does not exceed the amount listed at the bottom of the radioactive waste form. These packs are limited to 8.1 mCi/pack and sawdust (or other suitable absorbent material) is added to the fiber pack to absorb all radioactive liquids prior to disposal. There should be twice as much absorbent as necessary to absorb the liquid. Upon placing a radioactive material into a radioactive laboratory waste pack, the individual needs to enter the following information on the radioactive waste spreadsheet: Inventory number, radionuclide/material name, volume/weight, amount of radioactivity, initials/date of the individual making the entry, group and comments (if applicable). When a radioactive laboratory waste pack is full the waste pack is stored in an appropriate area until shipment for incineration.

Dow Corning Waste Stream Low-Level Radioactive
(Q8-1603A label)

Radioactive laboratory wastes that are absorbed on charcoal (charcoal filter traps), sawdust or silica gel are to be packaged into radioactive laboratory waste packs. These packs are limited to 22 mCi/pack. Upon placing a radioactive material into a radioactive laboratory waste pack, the individual needs to enter the following information on the radioactive waste spreadsheet: Inventory number, radionuclide/material name, volume/weight, amount of radioactivity, initials/date of the individual making the entry, group and comments (if applicable). When a radioactive laboratory waste pack is full the waste pack is stored in an appropriate area until shipment for incineration.

Dow Corning Waste Stream Low-Level Corrosive Radioactive Liquid
(Q8-6181 label)
Radioactive laboratory wastes that are absorbed on charcoal (charcoal filter traps), sawdust or silica gel are to be packaged into radioactive laboratory waste packs. It is acceptable to place ½ gallon corrosive/radioactive materials into the waste pack provided the total weight of the pack does not exceed the amount listed at the bottom of the radioactive waste form. These packs are limited to 8.1 mCi/pack and sawdust (or other suitable absorbent material) is added to the fiber pack to absorb all radioactive liquids prior to disposal. There should be twice as much absorbent as necessary to absorb the liquid. Upon placing a radioactive material into a radioactive laboratory waste pack, the individual needs to enter the following information on the radioactive waste spreadsheet: Inventory number, radionuclide/material name, volume/weight, amount of radioactivity, initials/date of the individual making the entry, group and comments (if applicable). When a radioactive laboratory waste pack is full the waste pack is stored in an appropriate area until shipment for incineration.

Dow Corning Waste Stream Low-Level Radioactive Solids with Barium
(Q8-1603B label, formerly Q8-6182 label)
Radioactive laboratory wastes that contain Barium are to be packaged into radioactive laboratory waste packs. These packs are limited to 22 mCi/pack. Upon placing a radioactive material into a radioactive laboratory waste pack, the individual needs to enter the following information on the radioactive waste spreadsheet: Inventory number, radionuclide/material name, volume/weight, amount of radioactivity, initials/date of the individual making the entry, group and comments (if applicable). When a radioactive laboratory waste pack is full the waste pack is stored in an appropriate area until shipment for incineration.

Dow Corning Waste Stream Low-Level Radioactive Animal Tissue
(Q8-1603D label, formerly Q8-6833 label)
Radioactive Animal Tissue Waste: ^{3}H or ^{14}C animal tissue wastes, with activity exceeding the 0.05 μCi /gram of animal tissue, are handled as radioactive waste and are to be packaged into radioactive laboratory waste packs. These packs are limited to 8.1 mCi/pack. Upon placing a radioactive material into a radioactive laboratory waste pack, the individual needs to enter the following information on the radioactive waste spreadsheet: Inventory number, radionuclide/material name, volume/weight, amount of radioactivity, initials/date of the individual making the entry, group and comments (if applicable). The animal tissues are stored in a refrigerator/freezer until shipped for incineration.

As per the regulations, certain liquid scintillation counting cocktail and animal tissue wastes containing radioactive material can be disposed of as if it were not radioactive, if there is:

- 0.05 μCi, or less, of ^{3}H or ^{14}C per gram of medium used for liquid scintillation counting (≤111,000 dpm/g of cocktail)
- 0.05 μCi, or less, of ^{3}H or ^{14}C per gram of animal tissue, averaged over the weight of the entire animal (≤111,000 dpm/g of animal tissue, averaged over the weight of the entire animal.)

Dow Corning Waste Stream Animal Carcasses
(Q8-1604 label, formerly Q8-6676 label)
Animal tissue waste that has been treated with ^{3}H or ^{14}C radioactive materials and are below the regulatory limits as described above, are deregulated (NRC/DOT) materials and are to be packaged into laboratory waste packs and shipped as animal tissue waste to Dow Chemical for incineration following DCC standards. Prior to removal from a restricted area or disposal, remove or deface any radioactive material label. The animal tissues are stored in a refrigerator/freezer until shipped for incineration.

Dow Corning Waste Stream Flammable/Toxic
(Q8-1200 label, formerly Q8-6199 label)
Scintillation media wastes that contain ^{3}H or ^{14}C radioactive materials and are below the regulatory limits as described above, are deregulated (NRC/DOT) materials and are to be packaged into flammable/toxic laboratory waste packs and shipped as hazardous waste following DCC standards. Prior to removal from a restricted area or disposal, remove or deface any radioactive material label. For radioactive scintillation media >0.05 μCi of ^{3}H or ^{14}C per gram of medium used for liquid scintillation counting, the cocktail is handled as general radioactive laboratory waste (Q8-6680).

DECAY IN STORAGE

^{32}P, ^{35}S, ^{51}Cr, OR ^{125}I Wastes: The minimum holding period for decay in storage is 10 half-lives of the longest lived radioisotope in the waste. After decay is complete and survey records indicate there is no detectable radioactivity above background, these wastes are to be transferred to Dow Chemical as hazardous waste for incineration. Prior to removal or disposal of empty uncontaminated containers to unrestricted areas, remove or deface the radioactive material label or otherwise clearly indicate that the container no longer contains radioactive material.

DECAY IN STORAGE (DIS) PROCEDURES

- Only short-lived waste (physical half-life of less than or equal to 120 days) may be disposed of by DIS
- Waste should be stored in suitable well-marked containers, and the containers should provide adequate shielding

- Liquid and solid wastes must be stored separately
- When the container is full it should be sealed. The sealed container should be identified with a label affixed or attached to it.
- The identification label should include:
  - Date when the container was sealed
  - The longest-lived radioisotope in the container
  - Date when ten half-lives of the longest-lived radioisotope will have transpired
  - Initials of the individual who sealed the container
- Transfer container to DIS area
- Decay for 10 half-lives of the longest-lived radioisotope in the container
- Prior to disposal as ordinary trash, each container should be monitored as follows:
  - Check the radiation detection survey meter for proper orientation
  - Survey the contents of each container in a low background area
  - Remove any shielding from around the container
  - Monitor all surfaces of the container
  - Discard the contents as ordinary trash only if the surveys of the contents indicate no residual radioactivity, i.e., surface readings are indistinguishable from background
  - Survey indicates residual radioactivity, return container to DIS area and contact RSO for further instructions
- Survey indicates no residual radioactivity, record the following:
  - Date the container was sealed
  - Disposal date
  - Type of waste (used or unused material, gloves, etc.)
  - Survey instrument used (Make, model and serial number)
  - Initials of individual performing surveys and disposing of the waste

RELEASE INTO SANITARY SEWERAGE

Discharge of ^{14}C radioactive material by release into a public sanitary sewerage system is authorized if the following conditions are met:

- Confirm that the radioactive material being discharged is readily soluble (or is readily dispersible biological material) in water
- Calculate the amount of ^{14}C radioactive material that can be discharged
- Make sure that the amount of ^{14}C radioactive material does not exceed the monthly and annual discharge limits specified in 10 CFR 20.2003(a)(4) and 10 CFR 20, Appendix B
- Record the date, radioisotope, estimated activity, location where the material was discharged (lab number), and initials of the individual discharging the radioactive material
- The ^{14}C radioactive material should only be discharged via designated release points
- Survey the area and decontaminate, if necessary
- Maintain records of the radioisotope, its quantity and concentration that is released into the sanitary sewer system

EMERGENCY RESPONSE PROCEDURES

In the case of an accident/spill involving radioactive materials a worker must take the following actions:

- If human health (serious injury) or safety is a concern follow standard emergency response procedures, inform emergency personnel that radioactive materials are involved and obtain medical care. Notify RSO and/or assistant RSO.
- If the accident/spill occurs on the person, wash contaminated skin with copious amounts of cool water and soap. For minor cut/abrasion/needle prick, wash contaminated skin with copious amounts of cool water and soap and control bleeding (Notify RSO and/or assistant RSO, seek medical attention).
- If the accident/spill occurs on the person's clothing, immediately remove contaminated clothing, wash contaminated skin with copious amounts of cool water and soap. Notify RSO and/or assistant RSO. Handle contaminated clothing as radioactive lab waste.
- If the accident/spill occurs to the lab environment (e.g., counter-top, lab floor, etc.), contain the spill with absorbent material (e.g. sawdust).
- Notify other personnel in the area that an accident/spill has occurred, and stop all traffic through the area (isolate area).
- Anyone potentially contaminated must not leave the area in order to minimize spread of contamination.
- Notify the RSO and/or assistant RSO immediately of the accident/spill. Notification should include a description of the incident, personnel involved, material which is involved, and location of incident.
- To determine the boundaries of the affected area begin by surveying (using an appropriate GM counter or performing a wipe test) from the outside of the spill moving inward toward the center until a positive reading is obtained. The outside of the boundary should be marked off with radioactive tape.
- The area must be decontaminated using appropriate detergents and solvents.
- Any clothing, which is contaminated, must be collected for disposal as radioactive waste.
- No traffic is allowed in the area until a satisfactory survey / wipe test is obtained.
- All materials used in the clean up must be considered as radioactive waste and prepared for appropriate disposal.
- Upon completing the decontamination effort the area can be opened for normal activities.
- A written report describing the incident and documenting the response activities is to be submitted to the RSO for the radiation safety files. This report should include a detailed description of the accident/spill, procedures to prevent future occurrences, and all surveys / wipe test results.

RADIATION WORKER – DECLARATION OF PREGNANCY

TO: Radiation Safety Officer, CO3101

In accordance with the NRC's regulations at 10 CFR 20.1208, "Dose to an Embryo/Fetus," I

_____ **am declaring that I am**
Print Last Name, First Name, Middle Initial

pregnant. I believe I became pregnant in _____ **(only the month and year need be provided).**

I understand the radiation dose to my embryo/fetus during my entire pregnancy will not be allowed to exceed 0.5 rem (5 mSv) (unless that dose has already been exceeded between the time of conception and submitting this letter). I also understand that meeting the lower dose limit may require a change in job or job responsibilities during my pregnancy. Furthermore, I understand that if I choose to continue working with radioactive materials, then I will use the fetal monitor badge provided to me. I have read and understand the Dow Corning Written Radiation Safety Program, the US Nuclear Regulatory Commission Regulatory Guides 8.13 Instruction Concerning Prenatal Radiation Exposure and 8.29 Instruction Concerning Risks from Occupational Radiation Exposure.

Signature: _____ **Date:** _____
Declared Pregnant Woman

Signature: _____ **Date:** _____
RSO or Designee

RADIATION WORKER – WITHDRAWAL OF DECLARATION OF PREGNANCY

TO: Radiation Safety Officer, CO3101

I am notifying the licensee that I am no longer pregnant or that I voluntarily withdraw my written declaration of pregnancy.[1]

Signature: _____ **Date:** _____
Declared Pregnant Woman

Signature: _____ **Date:** _____
RSO or Designee

1. If the declaration is not withdrawn, the written declaration may be considered expired after one year.

Dow AgroSciences LLC
9330 Zionsville Road
Indianapolis, IN 46268-1054

Training Documents

March 20, 1998

Dow AgroSciences

Mr. Mike Hill
Dow Corning Corporation
DC3/HES
Mail no. CO3101
P.O. Box 994
Midland, MI 48686-0994

Dear Mr. Hill:

PAUL LARSON; RADIOACTIVE MATERIALS RESPONSIBILITIES

During his employment at Dow AgroSciences (formerly DowElanco), Paul Larson served as both a Sealed Source Owner and a Principal Investigator. In these roles, he was responsible for, and held accountable for, the possession and use of both sealed and loose radioisotopes for research purposes. Paul attended the following Dow AgroSciences training courses:

- *Radiation Safety for New Users of Loose Radioisotopes*
- *Radiation Safety Annual Training*
- *Radiation Safety for Sealed Source Owners*
- *Radiation Safety Responsibilities for Principal Investigators*

Paul took his responsibilities seriously and performed this part of his job conscientiously.

Paul's experiences working with, and overseeing those working with, radioactive materials at Dow AgroSciences have helped him understand and appreciate the responsibilities of the Radiation Safety Officer. I strongly support Paul Larson for the job of Radiation Safety Officer at Dow Corning.

Please call me if you need additional information.

Sincerely,

Greg Socha
Industrial Hygiene Manager
Radiation Safety Officer
306 Building, E2
(317)337-3151

cc: Paul Larson

Certificate of Completion

awarded to

Paul S. Larson

for participation in

Radiation Safety Officer Course
May 4-8, 1998 - Madison, WI
presented by Engelhardt & Associates, Inc .

Susan J. Engelhardt
Susan J. Engelhardt, M.S.

Dee Kaiser
Dee Ann Kaiser, M.S.

Ralph Grunewald
Ralph Grunewald, Ph.D.

Judith Grunewald
Judith Grunewald, R.N., M.S.

Susan M. Langhorst
Susan M. Langhorst, Ph.D., CHP

Radiation Safety Officer Course

May 4-8, 1998

Madison, Wisconsin

Mon. 5/4/98	Description	Objectives	Trainer(s)
07:30 - 08:00 am	Continental Breakfast	Not Applicable (NA)	
08:00 - 08:10	Course Objectives/Overview	Understand course objectives. Meet trainers.	Bob Kaiser
08:10 - 08:30	How Radiation is Used • Medical uses • Industrial uses • Academic uses	Know common uses of radiation in industry, research & medicine.	Sue Engelhardt
08:30 - 08:50	Regulatory Agencies • Who regulates what • Where regulatory standards come from • NRC vs. Agreement States • Other agencies (e.g., OSHA, FDA, EPA, DOT)	Understand how the regulations are developed. Know the difference between Agreement vs. Non-Agreement states. Know the relationship between the NRC and other agencies.	Sue E.
08:50 - 09:00	Break	NA	
09:00 - 09:30	Basic Math Review • Scientific notation • Exponentials • Logarithms • Counting Statistics	Know how to use exponents, logarithms, and scientific notation in mathematical calculations. Know basic counting statistics for radioactive decay.	Sue Langhorst
09:30 - 09:50	Group Sessions	See handouts	All
09:50 - 10:00	Break	NA	
10:00 - 11:30	Radiation Physics • Types of radiation • Interactions with matter • Half-life • Radioactivity units	Know the various types and characteristics of radiation (e.g., alpha, beta, gamma) and their interactions in matter. Understand half-life, Ci, & Bq.	Ralph Grunewald
11:30 - 12:45 pm	Lunch	NA	
12:45 - 02:50 (10 min break)	Radiation Physics (continued)	See above	Ralph
02:50 - 03:00	Break	NA	
03:00 - 04:00	Group Sessions	See handouts	All

Tues. 5/5/98	Description	Objectives	Trainer(s)
07:30 - 08:00 am	Continental Breakfast	NA	
08:00 - 10:00 (10 min break)	Radiation Detection Equipment • Types of equipment • Appropriate uses • Demonstration of equipment • Self-reading dosimeters	Understand how to select and operate equipment for the different types of radiation. Understand the basic design principles of various detectors.	Ralph
10:00 - 10:10	Break	NA	
10:10 - 11:15	Group Sessions	See handouts	All
11:15 - 12:30 pm	Lunch	NA	
12:30 - 01:20	Radiation Dosimetry • Exposure and dose units • Types of dosimeters; how they work • NRC dose limits • Dose calculations	Understand radiation exposure and dose units (e.g., rad, rem, R, RBE, LET, QF). Know NRC dose limits. Know how to calculate dose from a point source.	Sue L.
01:20 - 01:30	Break	NA	
01:30 - 2:20	Radiation Protection • Time, distance, shielding • Rules for protection from radiation (including apparel) • Posting requirements • ALARA	Know methods used for radiation protection (e.g., time, distance, shielding, contamination control). Know how to apply inverse square law. Know what ALARA is and how to implement.	Dee Kaiser
02:20 - 02:30	Break	NA	
02:30 - 03:00	Sources of Radiation Exposure • Naturally occurring • Medical • Occupational • Life style	Understand typical levels of radiation exposure from common sources. Understand perceived vs. real risk	Sue E.
03:00 - 04:00	Group Sessions	See handouts	All

Wed. 5/6/98	Description	Objectives	Trainer(s)
07:30 - 08:00 am	Continental Breakfast	NA	
08:00 - 09:00	Radiation Biology • Cellular, tissue, and systemic effects • Delayed effects, early somatic effects • Acute radiation syndrome • Hormesis, threshold vs. non-threshold	Understand the biological effects of radiation and the dose levels where these effects occur.	Sue E.
09:00 - 09:10	Break	NA	
09:10 - 10:00	Risk vs. benefit	Understand perceived vs. real risk.	Sue E.
10:00 - 10:10	Break	NA	
10:10 - 11:30	Radiation Safety Programs • Written programs • Key elements (e.g., RSO/RSC, facility design, PPE, procedures, records, audits) • Recordkeeping requirements • Annual reviews	Know key elements of a radiation safety program. Know how to develop an effective program.	Sue L.
11:30 - 12:45 pm	Lunch	NA	
12:45 - 01:30	Responsibilities for Radiation Safety • Who is responsible • Legal issues	Understand the various responsibilities for radiation safety.	Sue E.
01:30 - 01:40	Break	NA	
01:40 - 02:20	Transportation • Regulatory requirements (NRC, DOT, IATA) • Shipper's responsibilities	Know regulatory requirements for transporting radioactive materials. Know shipper's responsibilities.	Dee
02:20 - 02:50	Radioactive Waste Management • Types of waste • Disposal options • Transfer vs. Storage	Know radioactive waste disposal regulations and options (e.g., sewer, DIS). Understand waste transfer and storage requirements (e.g., facility needs).	Sue E.
02:50 - 03:00	Break	NA	
03:00 - 04:00	Group Sessions	See handouts	All

Thur. 5/7/98	Description	Objectives	Trainer(s)
07:30 - 08:00 am	Continental Breakfast	NA	
08:00 - 08:50	NRC Regulations • Parts 30 - 35 (types of licenses) • Special requirements (gauges and licenses)	Understand general vs. specific licnense. Know which NRC regulations pertain to the different licenses (gauge, medical, etc.).	Sue E.
08:50 - 09:00	Break	NA	
09:00 - 09:50	NRC Regulations (continued) • Parts 19 and 20	Know critical provisions of these worker information and protection standards.	Sue E.
09:50 - 10:00	Break	NA	
10:00 - 11:15	Emergencies • Types of emergencies (gauge, medical, academic) • Procedures • Source leakage, loss • Emergency personnel as responders • Performance based training • Interactions with the public, media, and employees	Understand the RSO's role in planning for and preventing accidents. Know how to develop an emergency plan.	Judy Grunewald
11:15 - 12:30 pm	Lunch	NA	
12:30 - 04:00 (15 min break)	Laboratory Workstations • Lab A - Radioactive decay measurements • Lab B - Solid scintillator and Geiger counter analyses • Lab C - Facility/personnel surveys and decontamination • Lab D - Sealed source leak test and direct/scatter radiation measurements	See Laboratory Agenda Handout	All

Fri. 5/8/98	Description	Objectives	Trainer(s)
07:30 - 08:00 am	Continental Breakfast	NA	
08:00 - 08:50	Group Sessions - Writing a License • New, renewal, & amendment applications • NRC Form 313 or equivalent for Agreement states • Content • Fees	See handouts	All
08:50 - 09:00	Break	NA	
09:00 - 10:20	Group Sessions - Reportable Incidents • When to/not to report an incident • Interactions with the public and media	See handouts	All
10:20 - 10:30	Break	NA	
10:30 - 11:30	NRC/State Inspections • How to prepare • How to deal with inspectors • What to do if your inspection is going badly • What to do if called for an enforcement conference	Understand the inspection process. Know how to prepare for and respond to enforcement activities.	Sue E.
11:30 - 11: 50	Interactions with the Public and Media • Discussion of media contacts and public information on the sensitive issue of radiation	Understand the NRC's media notification criteria. Know key aspects of communicating with the public and media.	Sue E.
11:50 - 01:00	Examination & wrap-up	Complete exam and score 85% or better.	All

May 4-8, 1998 Radiation Safety Officer Course
Performance Objectives for the Research Group

These performance objectives are tailored to the participants' needs. Each session is 1 hour or longer.

Day One: Morning Session

- Calculate basic math problems

Day One: Afternoon Session

- Understand the regulatory structure for various types of radiation and radioactive materials commonly used in research.
- Know alpha, beta, and gamma decay processes and interactions with matter.
- Discuss basic counting statistics - distributions of a single count, standard deviation, and minimum detectable count.
- Know how to convert between various radioactivity units (Ci, Bq, dpm, dps, cpm).
- Calculate radioactive decay.
- Calculate attenuation of radiation.

Day Two: Morning Session

- Know various types of detectors for beta and gamma radiation (e.g., LSC, GM, LEG), and how to select appropriate equipment (e.g., for exposure rate monitoring vs. radioanalyses).
- Know how to perform function tests (hands-on) and understand calibration requirements for survey meters commonly used in research facilities.
- Understand regulatory requirements and NRC licensing process for research related use.

Day Two: Afternoon Session

- Know NRC dose limits and personnel dosimetry requirements - who needs dosimeters, when, why, etc.
- Understand practical radiation protection measures (e.g., use of time, distance, shielding, contamination control) and ALARA strategies for research settings.
- Know how to conduct wipe tests and leak tests for removable contamination.
- Know NRC required radiation warning signs, labels, postings, etc. needed in experimental settings.
- Calculate dose from a point source.

Day Three: Afternoon Session

- Discuss personnel bioassays for radioactive materials commonly used in research.
- Discuss radiation risk vs. benefit issues.
- Discuss RSO responsibilities and the critical components of a radiation safety program in a research facility.
- Discuss effective auditing techniques.
- Understand NRC requirements for training (frequency, content, etc.).
- Know how to recieve/ship a radioactive package.
- Discuss radioactive waste minimization, management, and disposal (including decay in storage) for radioactive materials commonly used in research.

Day Four: Laboratory Workstations

- Measure radioactive decay and calculate half-life. Complete worksheet and discuss findings.
- Measure scatter radiation around a sealed source, and observe meter calibration and sealed source leak test procedures. Complete worksheet and discuss findings/observations.
- Survey personnel and work area for radioactive contamination and discuss response procedures. Complete worksheet and discuss findings/observations.
- Count background, standard, and sample (wipe/leak test) using a Geiger counter and a solid scintillator. Calculate efficiency, minimum detectable activity, and sample activity. Complete worksheet and discuss findings.

Day Five: Morning Session

Writing a License

- Understand the do's and don'ts when writing a license.
- Know what references are available for assistance (e.g., NRC Regulatory Guides).

Reportable Incidents

- Know NRC requirements for reporting incidents.
- Understand the NRC's media notification criteria.

Certificate of Completion

awarded to

Paul Larson

for participation in

Radiation Safety Training – Las Vegas

February 2-4, 2010

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www.radexperts.com

Susan J. Engelhardt, M.S.

Joshua Walkowicz, M.S., CHP

Ralph Grunewald, Ph.D.

Judith Grunewald, R.N., M.S.

Michael T. Smith, A.S., EMT-P

Certificate of Completion

awarded to

Paul S. Larson

for participation in

Radiation Safety Seminar – Madison, WI

June 12-14, 2006

ENGELHARDT & ASSOCIATES, INC.
RADIATION CONSULTANTS
6400 Gisholt Dr., Suite, 111 Madison, WI 53713
Phone: 800.525.3078 Fax: 608.224.0821
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Dee Ann Kaiser, M.S.

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for participation in

Radiation Safety Seminar

June 16-18, 2004 - Madison, WI

presented by Engelhardt & Associates, Inc.

Susan Engelhardt

Susan J. Engelhardt, M.S.

Dee Kaiser

Dee Ann Kaiser, M.S.

Ralph Grunewald

Ralph Grunewald, Ph.D.

Judith Grunewald

Judith Grunewald, R.N., M.S.

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Radiation Safety Seminar

February 4-6, 2002 - Las Vegas

presented by Engelhardt & Associates, Inc.

Susan Engelhardt

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Dee Ann Kaiser, M.S.

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Radiation Safety Seminar

February 1-3, 2000 - Las Vegas

presented by Engelhardt & Associates, Inc .

Susan Engelhardt
Susan J. Engelhardt, M.S.

Ralph Grunewald
Ralph Grunewald, Ph.D.

Dee Kaiser
Dee Ann Kaiser, M.S.

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Judith Grunewald, R.N., M.S.

John Walkowicz
Joshua Walkowicz, M.S.

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Radiation Safety Seminar

February 2-4, 1999 - Las Vegas

presented by Engelhardt & Associates, Inc .

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Susan J. Engelhardt, M.S.

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Dee Ann Kaiser, M.S.

Ralph Grunewald
Ralph Grunewald, Ph.D.

Judith Grunewald
Judith Grunewald, R.N., M.S.

John Walkowicz
Joshua Walkowicz, M.S.

Hazardous Materials Advisory Council

hmac

Certifies that

PAUL LARSON
DOWELANCO
BUILDING 306/SECTION A1/OFFICE 145
9410 NORTH ZIONSVILLE
INDIANAPOLIS, IN 46268

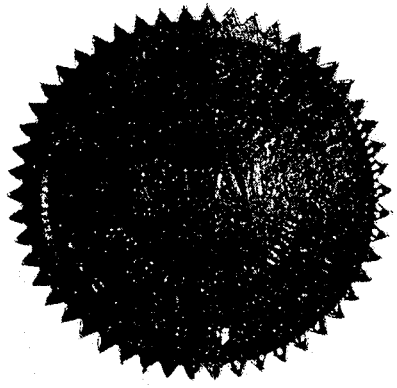
has been awarded *CEU for successful completion of*

HMT-610
RADIOACTIVE MATERIALS
PACKAGING AND TRANSPORTATION
OF EXCEPTED AND TYPE A PACKAGES
HOUSTON, TX DECEMBER 15 - 17, 1992

conducted by

HAZARDOUS MATERIALS ADVISORY COUNCIL

Emma E DiMario
INSTRUCTOR



Documentation Of Training: Hands-On Use of Radioactive Materials

The following activities, as applicable, were observed to document hands-on use of radioactive materials as part of Dow Corning's employee Radiation Safety Training:

✓ Preparation of work area (i.e. use of impervious trays for containment).

✓ Use of the appropriate personal protective equipment.
Indicate type(s) used:
Gloves
Safety Glasses
Lab coat

✓ Transport and handling of radioactive stock solutions.

RAC 1-Oct-98 ✓ Dilutions and/or specific activity checks.

✓ Labeling of samples.
Indicate type of sample(s)
^{14}C PDMS for Transfer
Wipe Test Swabs

✓ Use of the Liquid Scintillation Counter.

Use of the Gamma Counter N/A.

✓ Clean-up of work area following use.

✓ Waste disposal.

✓ Wipe testing of work area following use.

Comments: Also Reviewed Shipping process and transfer documentation, including distribution *

* This was inadvertently left out of the documentation by T. Galbraith (no longer in this department)

This training session was completed satisfactorily and the "Trainee" (new employee) understands his/her responsibilities.

Paul A. Larson
Employee Date

Thomas J. Galbraith 4/2/98
Trainer Date

This training was conducted at the same time. RAC 04 Jun 99

DOCUMENTATION OF TRAINING: RADIOACTIVE MATERIALS

The following topics on HES radioactive materials use and safety were discussed as part of new employee safety orientation.

- ☑ Definitions appropriate to radioactive materials.
- ☑ Radiation Safety Officer and Radiation Safety Committee.
- ☑ License limits and types of radioactive materials for DC3.
- ☑ Transportation of radioactive materials within DC3.
- ☑ Ordering and receipt of radioactive materials.
- ☑ Signs and labeling indicating radioactive materials lab areas, equipment, and samples; areas in DC3 which use radioactive materials.
- ☑ Storage of radioactive materials: stock solutions and experimental samples (soil, water, biological fluids, etc.)
- ☑ Amount of radioactive materials used in our experiments; our desire to use as minimal amounts of radioactivity as possible.
- ☑ Radioactive waste minimization and disposal.
- ☑ Bookkeeping of radioactive materials, and the use of forms 10-5 and 10-6.
- ☑ Procedures in case of a radioactive spill
- ☑ Monitoring (wipe testing) of laboratories. Use of surveillance equipment.
- ☐ Use of our scintillation counters. (SOP 13.7)
- ☑ Personal protective equipment: lab coats, gloves, eyeglasses, fume hoods; respirator and protective shield if necessary.
- ☑ SOPs for radioactive materials (Section 10).
- ☑ Personnel monitoring.
- ☑ Annual training of personnel.
- ☑ Receipt of a copy of the license.
- ☑ Reading of the license.
- ☑ Tour of the laboratory areas.

I understand the above training.

Paul A Larson 12-16-97 — Employee — Date

Thomas Schmidt 12/16/97 — Trainer — Date

Wrong Date 12/17/97 12/16/97

Certificate of Completion

Paul Larson

Refresher Training in Radiation Safety
Dow Corning
Midland, MI

24 March, 1998

Susan J. Engelhardt
President

Engelhardt & Associates, Inc.

P. Larson

SELECT <u>ONE OR MORE</u> CORRECT ANSWERS FOR EACH OF THE FOLLOWING QUESTIONS.

13. Which of the following are considered to be delayed effects of radiation?
    a. Carcinogeneses
    b. Life span shortening
    c. Stunted growth
    d. Cataracts
    e. All of the above

14. Free radicals are:
    a. Electrically neutral
    b. Have an odd number of electrons
    c. Are usually responsible for the indirect effect of radiation
    d. All of the above

15. Which of the following are examples of Radiation Safety Officer (RSO) duties?
    a. Licensing
    b. Audits/inspections
    c. Control of radioactive material
    d. Waste disposal
    e. Keep management informed on status of the radiation safety program.

16. When responding to a radiation accident the RSO should:
    a. assure the victim has been stabilized prior to treating for contamination
    b. notify administration and wait for further instructions
    c. remove the victim from the radiation area, if appropriate
    d. decontaminate the victim and then provide care so you will not become contaminated

17. When treating a suspected radiation accident victim always:
    a. obtain a history of the accident
    b. complete a radiation survey prior to treatment if not seriously injured to determine type and severity of the radiation dose
    c. since there may be no external or visual damage never send the person home without medical or RSO approval
    d. wear protective clothing

18. Which of the following radiation accidents will not require any additional radiation protection precautions for emergency responders?
    a. contamination
    b. incorporation
    c. irradiation
    d. contaminated wounds

19. Which of the following are gas-filled detectors?
    a. Geiger-Mueller counter
    b. proportional counter
    c. thermoluminescent dosimetery
    d. ionization chambers
    e. film badge

P. Larson

20. Which of the following are operating or functional characteristics of the Geiger-Mueller type of survey instrument?
    (a) it is good for measuring background levels of radiation
    (b) it requires little or no amplification
    (c) it is relatively inexpensive
    d. it provides an excellent measure of particle energy

PROVIDE WRITTEN ANSWERS TO THE FOLLOWING.

21. One mCi (millicurie) equals:
    3.7×10^{7} dps (disintegrations per second)
    2.22×10^{9} dpm (disintegrations per minute)
    3.7×10^{7} Bq (Becquerel)

22. List three methods used for protection from external radiation exposure, and one method used to detect (and prevent the spread of) contamination?
    time, distance & shielding
    Surveys (meter and/or wipe tests)

23. Explain the ALARA concept:
    use methods and procedures to limit exposure to radiation to levels as low as reasonably achievable (§20.1002)

24. What is the difference between contamination and irradiation?
    contamination is radioactivity in a place where it is not supposed to be whereas irradiation is the energy being produced from a radiation source (gamma or x rays).

25. Describe the process for doing a leak test:
    with a Q-Tip swab or filter paper (wetted) apply pressure and wipe an appropriate area of sealed source to be wipe tested

DowElanco
9330 Zionsville Road
Indianapolis, IN 46268-1054

DowElanco

Building 306/A-1
February 3, 1995

Greg Sochá, 306/E-2, Indianapolis

LOOSE ISOTOPE AND SEALED SOURCE RESPONSIBILITIES

Greg,

At the start of my career, I worked in the Specialty Synthesis group, under the supervision of Len McKendry, from June, 1986 until November, 1991. The following is a list of responsibilities I had during this period as they pertain to loose isotopes and sealed sources:

- Preparation of labeled compounds (synthesis, purifications, hydrolysis, esterifications, etc...). The activities I would work with would range from 100 μCi to 200 mCi.
- Upon receipt of radioactive materials into our area I would perform and document the necessary wipe tests.
- I was responsible for keeping inventory in the Specialty Synthesis group for loose isotopes (amounts received, tracking disposition of material). I kept track in a log book (hard copy) and also on a Lotus 1-2-3 spreadsheet.
- Performed monthly wipe tests in the laboratory and sometimes weekly (dependant upon amount of radioactive material I was working with). I kept the official records of these wipe tests.
- Prepared loose isotopes for shipment (Shipment form, transaction form, wipe test of package, ensured that we had current NRC license on file for consignee).
- I handled disposal of solid and liquid waste generated by the Specialty Synthesis laboratory and coordinated transfer of waste to Dow incinerator insuring that the Dow policies governing radioactive waste disposal were adhered to.
- I was the isotope owner for the low level laboratories at the Dow Ag farm as approved by the Dow RSC & RSO until leaving the group

in 1991. My duties included assuring that all loose isotope users had been approved by Dow RSC & RSO (ca. 50-60 people), that all approved users signed and received a copy of their Radioisotope User Authorization, that all designated areas were properly labeled and posted (15 labs, 4 greenhouse bays, a walk-in freezer, etc...) and ensuring that these areas performed their monthly wipe tests and properly recorded transactions (inventory).

- I was the person responsible for maintaining the integrity of our sealed source inventory in Midland. I performed wipe tests of new sealed source instruments, documented sealed source transaction forms, maintained inventory of amounts, isotope, location & owners, and shipped sealed sources from our site.
- Prior to our move from Midland to Indianapolis I succesfully completed and became a certified shipper for radioactive materials packaging and transportation of Excepted and TYPE A radioactive packages. I served as the expert for DowElanco personnel in Midland to insure that shipments of all radioactive materials (loose isotopes & sealed sources) had the proper packaging (markings & labels) and documentation (proper shipping names & hazard classifications) from Midland to Indianapolis.

Paul S. Larson

Paul S. Larson
Formulations: Analytical & Product Chemistry
(317) 337-3583

Last Name	Larson
First Name	Paul
Middle Initial	S.
Master No.	85846
Social Security No.	382-70-4820
Date	09/15/92
Course Name	DowElanco Radiation Safety Program Overview
Course No.	13014
P.I.	Winkle

January 7, 1993

K. Swayze
306 Building, A1-146

cc: P. Larson, 306 Building, A1-145

SHIPMENT OF RADIOACTIVE MATERIALS

During the past two months, DowElanco has received several shipments of radioactive materials at the Indianapolis site. Some of those shipments came with paperwork so incomplete and incorrect that it was exceptionally difficult to determine the exact contents of packages. On the opposite end of the spectrum, however, were the packages shipped to our facility from Midland, MI, by Paul Larson. The labels and packing lists were clear and accurate. This greatly facilitated our jobs in the DowElanco Radiation Safety Office.

We appreciate the quality of work and the conscientiousness shown by Paul Larson. The purpose of this letter is to call that appreciation to your attention.

Greg E. Socha
Radiation Safety Officer
306 Building, D2-936
9410 Zionsville Road
(317)337-3151

TRAINING RECORD

Agricultural Chemistry R&D Laboratories, 9001 Building, Midland, MI

Name: Paul S Larson

Type of Training	Trainer	Training Period	Signature/Date
Radiation Safety	S. Maxy	1987	Paul S. Larson 3-87
Radiation Safety	S. Maxy	1988	Paul S. Larson 3-88
Radiation Safety	S. Maxy	1989	Paul S. Larson 3-89
Radiation Safety	S. Maxy	1990	Paul S. Larson 3-90
Radiation Safety	E. Crim	1991	Paul S. Larson 3-91
Managing Interpersonal Relations		1990	Paul S. Larson 4-90
Performance Management	J. Ringa	1991	Paul S. Larson 10-91
Dangerous Goods Seminar for air transportation (ICAO/IATA)	Federal Express	1991	Paul S. Larson 8-91
HM-181 Hazardous Materials Seminar for ground transportation	HMAC(GSI)	1992	Paul S. Larson 2-92

training.wp/gmw

TRAINING RECORD

Agricultural Chemistry R & D Laboratories, 9001 Building, Midland, MI

NAME: Paul S. Larson

Type of Training	Trainer	Training Period	Trainee/Trainer Signature/Date
Radiation Safety and Radioisotope handling	G.W. Engdahl and manual	6/86	Paul S. Larson 7/20/87
Retraining for Radiation safety and radioisotope handling (yearly)	Scott Maxy	2/87	Paul S. Larson 7/20/87
Analytical HPLC	Manual and L.H. McKendry and Gary Roth	6/86 thru present	Paul S. Larson 7/20/87 L.H. McKendry 7/24/87
Prep HPLC	Manual and L.H. McKendry and Gary Roth	3/87 thru present	Paul S. Larson 7/20/87 L.H. McKendry 7/24/87
Gas Chromatography	Ferris State College, Manual, L.H. McKendry, and Gary Roth	9-85 thru present	Paul S. Larson 7/20/87 L.H. McKendry 7/24/87
Infrared Spectrophotometry	Ferris State College, Manual, L.H. McKendry, and Gary Roth	9-85 thru present	Paul S. Larson 7/20/87 L.H. McKendry 7/24/87
TLC Radioscanner	Manual, L.H. McKendry, and Gary Roth	6-86 thru present	Paul S. Larson 7/20/87 L.H. McKendry 7/24/87
EM-390 NMR	Manual, L.H. McKendry, L. Markley, and Gary Roth	6-86 thru present	Paul S. Larson 7/20/87 L.H. McKendry 7/24/87
Finnigan 4600 GC/MS	L. Bjerke	5/87 thru present	Paul S. Larson 7/20/87

Paul S. Larson
4512 W. Wackerly Rd.
Midland, MI 48640
(517) 631-2172

Objective

To work in the analysis and/or research and development of products.

Education

Saginaw Valley State University, Saginaw, Michigan.
Bachelor of Science degree: Major: Chemistry, Minor: Mathematics
Obtained December 13, 1991. Overall GPA, 3.07.

Ferris State University, Big Rapids, Michigan
Associate in Applied Science - Industrial Chemistry Technology.
Obtained May 24, 1986. Overall GPA, 3.03.

Experience

December 8, 1997 to Present
Dow Corning, Health and Environmental Sciences: Test Article Control and Characterization Dept., Midland, MI.
Job Title: Senior Chemist. Duties include characterizing test/control/reference substances and radiolabeled compounds.

September 1, 1994 to November 7, 1997.
DowElanco, Formulations: Analytical & Product Chemistry Group, Indianapolis, IN
Job Title: Chemist. Duties include characterizing analytical standards, test substances, reference compounds and radiolabeled compounds using existing or developing new analytical methods. Ensure compliance with laboratory safety procedures, Good Laboratory practices, NRC and other regulatory requirements. Duties also include planning, writing protocols, conducting analyses and reporting product chemistry and formulation analytical studies which support product development and registration. Repairs and maintains instrumentation used in analytical work.

January 1, 1992 to August 31, 1994.
DowElanco, Formulations: Analytical & Product Chemistry Group, Indianapolis, IN
Job Title: Test Substance Coordinator. Developed, implemented and maintained a manageable database tracking system for analytical standards, test substances, reference compounds and formulations used in registration studies. Duties included coordinating the necessary resources to insure procurement, receipt, identification, storage, handling and distribution of these materials.

June 2, 1986 to December 31, 1991.
Dow Chemical Co., Specialty Synthesis Group, Midland, MI
Job Title: Research Technologist. Duties included preparing radiolabeled and unlabeled products and related compounds for use in environmental, metabolism, residue and field trials.

September, 1984 to May, 1986.
Ferris State University, Big Rapids, MI
Job Title: Security Guard. Duties included working as night security guard while attending school. Earnings were used to supplement college expenses.

Previous employment from February, 1977 to August, 1984 included working as a counter salesman in auto parts stores and diesel dealerships.

Interests

Enjoy working with my hands. Like outdoor activities.

PRIVATE

Memorandum

To: Jeremy Durham, RSO
From: Vinita Pandit
Date: 01/03/2011
Re: Qualifications

Job Title: Assistant HES Specialist
I have been working with Dow Corning as a synthetic chemist since July 2008. I am an authorized user for handling the isotopes in synthesis area. My day to day activities at work involve synthesizing 13C and 14C-labelled materials. I have synthesized many of these isotopically labeled materials in past couple years. While performing these day to day tasks, I am a member of the radiation safety committee and attend quarterly radiation safety committee meetings. I have attended the offered in-house training for radiolabeled materials. I have also attended a 3 day Radiation Safety Training offered by Engelhardt & Associates, Inc in Feb 2010. A copy of the content of this training and certificate of completion is attached with this memorandum.

Vinita Pandit
01/03/2011

VINITA PANDIT

TABLE OF CONTENTS

Certificate of Completion

awarded to

Vinita Pandit

for participation in

Radiation Safety Training – Las Vegas
February 2-4, 2010

ENGELHARDT & ASSOCIATES, INC.
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Michael T. Smith, A.S., EMT-P

UPS Internet Shipping: View/Print Label

1. **Print the label(s):** Select the Print button on the print dialog box that appears. Note: If your browser does not support this function select Print from the File menu to print the label.

2. **Fold the printed label at the solid line below.** Place the label in a UPS Shipping Pouch. If you do not have a pouch, affix the folded label using clear plastic shipping tape over the entire label.

3. **GETTING YOUR SHIPMENT TO UPS**
   Customers without a Daily Pickup
   Schedule a same day or future day Pickup to have a UPS driver pickup all of your Internet Shipping packages.
   Hand the package to any UPS driver in your area.
   Take your package to any location of The UPS Store®, UPS Drop Box, UPS Customer Center, UPS Alliances (Office Depot® or Staples®) or Authorized Shipping Outlet near you. Items sent via UPS Return Services℠ (including via Ground) are also accepted at Drop Boxes.
   To find the location nearest you, please visit the 'Find Locations' Quick link at ups.com.

   Customers with a Daily Pickup
   Your driver will pickup your shipment(s) as usual.

FOLD HERE