030-29281 L+L=27849

NRC FORM 313
(1-84)
10 CFR 30, 32, 33, 34, 35 and 40

# APPLICATION FOR MATERIAL LICENSE

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED BY OMB
3150-0120
Expires: 8-31-87

**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.

**FEDERAL AGENCIES FILE APPLICATIONS WITH:**

U.S. NUCLEAR REGULATORY COMMISSION
DIVISION OF FUEL CYCLE AND MATERIAL SAFETY, NMSS
WASHINGTON, DC 20555

**ALL OTHER PERSONS FILE APPLICATIONS AS FOLLOWS, IF YOU ARE LOCATED IN:**

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

U.S. NUCLEAR REGULATORY COMMISSION, REGION I
NUCLEAR MATERIAL SECTION B
631 PARK AVENUE
KING OF PRUSSIA, PA 19406

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

U.S. NUCLEAR REGULATORY COMMISSION, REGION II
MATERIAL RADIATION PROTECTION SECTION
101 MARIETTA STREET, SUITE 2900
ATLANTA, GA 30323

**IF YOU ARE LOCATED IN:**

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

U.S. NUCLEAR REGULATORY COMMISSION, REGION III
MATERIALS LICENSING SECTION
799 ROOSEVELT ROAD
GLEN ELLYN, IL 60137

**ARKANSAS, COLORADO, IDAHO, KANSAS, LOUISIANA, MONTANA, NEBRASKA, NEW MEXICO, NORTH DAKOTA, OKLAHOMA, SOUTH DAKOTA, TEXAS, UTAH, OR WYOMING, SEND APPLICATIONS TO:**

U.S. NUCLEAR REGULATORY COMMISSION, REGION IV
MATERIAL RADIATION PROTECTION SECTION
611 RYAN PLAZA DRIVE, SUITE 1000
ARLINGTON, TX 76011

**ALASKA, ARIZONA, CALIFORNIA, HAWAII, NEVADA, OREGON, WASHINGTON, AND U.S. TERRITORIES AND POSSESSIONS IN THE PACIFIC, SEND APPLICATIONS TO:**

U.S. NUCLEAR REGULATORY COMMISSION, REGION V
MATERIAL RADIATION PROTECTION SECTION
1450 MARIA LANE, SUITE 210
WALNUT CREEK, CA 94596

**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 JURISDICTION.**

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

- [X] A. NEW LICENSE
- [ ] B. AMENDMENT TO LICENSE NUMBER _____
- [ ] C. RENEWAL OF LICENSE NUMBER _____

2. NAME AND MAILING ADDRESS OF APPLICANT *(Include Zip Code)*

RECEIVED
'86 JUN -4 A10:35
U.S. NUCLEAR REGULATORY COMMISSION
REGION 1
OFFICE OF RADIATION SAFETY

3. ADDRESS(ES) WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED.

NEVILLE-SYNTHESE ORGANICS, INC.
P. O. Box 98
Oil City, PA. 16301

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

Edward G. Stets

TELEPHONE NUMBER

814-677-2028

SUBMIT ITEMS 5 THROUGH 11 ON 8½ 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 AND EXPERIENCE.

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

9. FACILITIES AND EQUIPMENT.

10. RADIATION SAFETY PROGRAM.

11. WASTE MANAGEMENT.

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

FEE CATEGORY 3P

AMOUNT ENCLOSED $ 230.00

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, 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.

| SIGNATURE–CERTIFYING OFFICER | TYPED/PRINTED NAME | TITLE | DATE |
|---|---|---|---|
| R Kullmann | R. Kullmann | Plant Manager | 5-13-86 |

14. VOLUNTARY ECONOMIC DATA

a. ANNUAL RECEIPTS

- [ ] <$250K
- [ ] $250K–500K
- [ ] $500K–750K
- [ ] $750K–1M
- [ ] $1M–3.5M
- [ ] $3.5M–7M
- [ ] $7M–10M
- [ ] >$10M

b. NUMBER OF EMPLOYEES *(Total for entire facility excluding outside contractors)*

c. NUMBER OF BEDS

d. WOULD YOU BE WILLING TO FURNISH COST INFORMATION *(Dollar and/or staff hours)* ON THE ECONOMIC IMPACT OF CURRENT NRC REGULATIONS OR ANY FUTURE PROPOSED NRC REGULATIONS THAT MAY AFFECT YOU? *(NRC regulations permit it to protect confidential commercial or financial–proprietary–information furnished to the agency in confidence)*

- [ ] YES
- [ ] NO

**FOR NRC USE ONLY**

| TYPE OF FEE | FEE LOG | FEE CATEGORY | COMMENTS | APPROVED BY |
|---|---|---|---|---|
| App | June 3 I | 3P | "OFFICIAL RECORD COPY" ML10 105567 | Messer |
| AMOUNT RECEIVED | CHECK NUMBER | | | DATE 6/3/86 MAY 23 1986 |
| $230 | 5467 | | | |

PRIVACY ACT STATEMENT ON THE REVERSE

8611200544 860805
REG1 LIC30
37-27849-01 PDR

NEVILLE-SYNTHESE ORGANICS, INC.

Oil City Plant

Application for Material License
Items 5 thru 11

Item 5

| | Isotape | Manufacturer | Model No. |
|---|---|---|---|
| a. | Cesium 137 | Kay-Ray | 7050 (1 each) |
| | Cesium 137 | Kay-Ray | 6062 (4 each) |

| | Gauge | Source Holder | |
|---|---|---|---|
| b. | Level | 7062 | (4 each) |
| | Density | 6050 | (1 each) |

| | Gauge | Source Holder | Activity |
|---|---|---|---|
| c. | Level | 7062 | 100 m Ci |
| | Density | 7050 | 200 m ci |

Item 6

Licensed material will be used in a Sealed Source as density and level gauges in a chemical manufacturing plant. Each source capsule is contained in a Kay-Ray Model 7062 or Model 7050 housing unit.

Item 7

Edward G. Stets - Radiation Safety Officer

a. B.S. Ch.E - Indiana Institute of Technology, Ft. Wayne, Indiana
b. Certified as RSO by attending a training course sponsored by:
Applied Health Physics
P. O. Box 197
Pittsburgh, PA. 15102
Location - Washington, D.C.
Dates - 3-24-86 thru 3-28-86
c. Chemical plant experience for one (1) year responsible for Sealed Source use, leak testing, and supervision.

Frank J. Sommerfield - Chief Engineer

a. B.S. Ch.E - Carnegie Mellon, Pittsburgh, PA.
M.S. Ch.E - W. Va. College of Graduate Studies
Registered Professional Engineer #PE-031758-E
b. Chemical plant management included supervisory experience with radiation sources for ten (10) years.

Andrew J. McAuley - Plant General Foreman

a. B.S. Chemistry - Indiana University of Pennsylvania
b. Chemical plant management experience with radiation sources for past ten (10) years. Supervised the use of Sealed Source gauging devices. Familiar with basic operation of the Sealed Source gauging devices and necessary precautions associated with radioactive substances.

Item 7 - continued

Jamil E. Elayan - Maintenance Supervisor

a. B.S. Ch.E. - University of Illinois
b. Chemical plant supervision included supervision of the use of Sealed Source devices for the past five (5) years.

Item 8

Radiation Safety Officer will conduct training classes for individuals working in or frequenting restricted areas.

Radiation survey will be conducted to ensure safety of personnel.

Safety factors such as time, shielding, and distance will be stressed to personnel.

Because of the location of the sources, significant exposures are unlikely.

Item 9

Model #7050 - Serial No. 2714 - Filter Washer CC Building
Model #7062 - Serial No. 7515A - 312 Kettle
Model #7062 - Serial No. 7515B - 312 Kettle
Model #7062 - Serial No. 7516A - 340 Kettle
Model #7062 - Serial No. 7516B - 340 Kettle

Environmental conditions will be normal indoor temperatures with no corrosion or vibration on Model No. 7050. Environmental conditions will be normal year round outdoor temperatures with no corrosion or vibration on Models No. 7515A, 7515B, 7516A, and 7516B.

Periodic inspections will be made by the RSO for proper shutter operation, visibility of labels, and condition of gauges.

In the event of an emergency, the RSO (Edward Stets) is to be notified at telephone number 814-336-1478.

Item 10

Radiation Safety Program

10.1 Service such as device relocation or maintenance will be performed by:

Kay-Ray, Inc.
516 West Campus Drive
Arlington Heights, IL. 60004
NRC License # 12-11184-01

Item 10 - continued

10.2 Personnel Monitoring Equipment

No personnel monitoring is required. Shielding provided by the source holders will limit exposures to less than 0.125 rem per year. Radiation levels at a distance of one foot from the nearest accessible surface are less than 5 mR/hr. Because of the locations of the sources, significant exposures are unlikely.

10.3 Radiation Detection Instrument

Neville-Synthese Organics, Inc. will have available for use a calibrated, operable survey meter that can measure at least 1 through 200 milliroentgens per hour. A Ludlum Model 3 Survey Meter will be used for radiation surveys.

The instrument will be calibrated so that the readings are ± 20% of the actual values over the range of the instrument.

Date of last calibration is enclosed. Next calibration date is affixed to the survey meter.

The calibration records will be kept for a minimum of two (2) years after each calibration by:

Kay-Ray, Inc.
516 West Campus Drive
Arlington Heights, IL 60004
NRC License # 12-11184-01

10.4 Leak Testing

Leak tests will be made for source leakage at least once every three (3) years by:

Kay-Ray, Inc.
516 West Campus Drive
Arlington Heights, IL. 60004
NRC License # 12-11184-01

The units will be tested for integrity (source leakage) at least once every three (3) years as follows:

1. Obtain the cotton-tipped applicators and the bottle containing the wipe solution as provided by the Radiation Protection Officer.

2. Moisten the applicators in the solution and wipe the source holder surfaces, around seams and bolts, handle shafts, external source plug, where contamination is most likely to appear. The radioactive material itself may be in a small, powder-like form and if the steel encapsulation fails, the material can appear on the exterior of the source holder at places where unwelded seams occur, around shaft bushings, or around bolt penetrations.

Item 10 continued

3. After wiping, place each applicator in a vial (cotton down) and break the wooden seams off against the vial edge so that the top can be resealed. Care should be taken not to touch the cotton end of the applicators with the fingers following the wiping operation.

4. Place the vial containing the cotton swab in an appropriate package (for mailing) after securely sealing the vial. Identify the device tested on the vial (label) or number each test separately with a clean metal stylus on the underside of the cap and forward a separate page which identifies sample number to source wiped.

5. Package the information sheets with the wipe test vials.

6. Return the wipe test package to:

Applied Health Physics
P. O. Box 197
Pittsburgh, PA. 15102
NRC Licence # 37-09135-01

10.5 Lock-Out Procedures

Lock-out procedures will be developed so the personnel will not be subjected to unnecessary exposure. They will be provided to the employees, and posted for employee information. The RSO will be responsible for ensuring that lock-out procedures are followed.

10.6 Performance of Services

Services will be performed according to the license agreement.

Item 11

Waste Management

No radioactive waste products are generated. Disposal will be by transfer to a licensee specifically authorized to possess the radioactive material.

Applied HEALTH PHYSICS inc.
2980 Industrial Blvd. Box 197 • Bethel Park, Pa. 15102 • Phone 412 • 563-2242

# INSTRUCTIONS FOR USE OF MARK V LEAK TEST KIT ON SEALED SOURCES

These procedures are to be followed by the individual trained and authorized by the licensee's RSO to employ the Mark V Leak Test Kit for leak testing sealed sources of radioisotopes. Should any question arise concerning proper use of the Kit, contact Applied Health Physics, Inc.

1. Pre-Test Procedures

In preparing the Mark V Leak Test Kit, follow these simple procedures:

a. Remove the plastic cap with its cotton swab insert from the plastic test tube. Add a few drops of water to dissolve the powdered wetting agent in the tube. Slightly dampen the swab's cotton tip with the wetting agent solution, and discard any unused solution that may remain in the tube.

Return the prepared swab to the test tube.

b. Complete the information required on the self-sticking, circular leak test label which is included in the Kit, and securely attach to the midsection of the test tube.

c. Obtain a remote handling device, such as an AHP Protecta-Holder, which will be used in manipulating the swab stick during the actual testing procedure.

d. Carry out final preparation for all radiation protection measures that must be employed.

2. General Testing Procedures

The following general testing procedures should be used on sealed sources:

a. Grasp the cap or the bare end of its swab stick with the AHP Protecta-Holder or other suitable remote handling device.

b. Carefully, but firmly, wipe the dampened tip of the cotton swab over surface areas of the sealed source. With certain sealed sources that are located or permanently used in special equipment, it is only necessary to wipe surfaces of the mounting or storage device on which radioisotope contamination might be expected to accumulate.

c. Immediately following the wiping procedure, dispense with the remote handling device and securely replace the cap and its swab insert in the labeled plastic test tube. Avoid touching the cotton tip to the body or other objects.

3. Post-Test Procedures

Pursuant to completion of the leak test, these steps must be taken:

a. Complete the Mark V Leak Test Data Form in a legible fashion. This form must be signed by the individual who performed the sealed source leak test.

b. Enclose the Data Form and the sealed plastic test tube in the mailing box, and seal the box. Fill in the proper return address on the Applied Health Physics, Inc.'s shipping label and securely attach to the box.

c. Monitor all external surfaces of the mailing box with a calibrated survey meter, such as a Geiger-Muller meter with an end-window probe detector. Post Office Department regulations require that radiation levels at any surface of the box must be less than 10 milliroentgens for 24 hours; i.e., an average of approximately 0.4 milliroentgens per hour.

   If results of the survey meet these requirements, proceed with mailing the Mark V Leak Test Kit to Applied Health Physics, Inc. Should the survey indicate that any surface of the box has a dose-rate greater than 0.4 milliroentgens per hour, immediately notify Applied Health Physics, Inc. by telephone.

# APPLIED HEALTH PHYSICS, INC.

## MARK V LEAK TEST DATA FORM

*Complete this form in a legible fashion and return with the appropriate leak test specimen to Applied Health Physics, Inc., 2886 Industrial Blvd., P.O. Box 137, Bethel Park, PA 15102. Phone Area Code (412) 563-2262.*

NOTE: DO NOT TEST MORE THAN ONE (1) SEALED SOURCE PER KIT.

This is to certify that I have followed the instructions governing the procurement of the enclosed leak test specimen using the Mark V Leak Test Kit. This specimen _____(leak test tube label number) was taken by: _____ person performing test on _____(date).

SOURCE DESCRIPTION:

| Radioisotope | Activity(mC) | Model No. | Serial No. | Manufacturer |
|---|---|---|---|---|
| | | | | |

INSTALLED IN:

| Device (gauging, exposure, therapy, storage) | Model No. | Serial No. | Manufacturer |
|---|---|---|---|
| | | | |

LOCATION:

| Company | Address |
|---|---|
| | |

By-product Materials License Number _____

*In the event this specimen indicates leakage and/or contamination of 0.005 microcurie or more, I request that you notify me promptly by the method denoted below and I agree to take appropriate action as required by Title 10-CFR-31.5d(3)(6) and/or 34.25(d), or conditions of the above-mentioned license.*

☐ Telephone(Collect)

☐ Telegraph(Collect)

☐ Air Mail Spec. Del.

_____ *(person to be contacted)*

*Area Code: ( )* _____ *Telephone Number*

*Do not write below this line.*

Analysis of the leak test specimen, No._____, by Applied Health Physics, Inc. indicated the presence of _____microcurie of _____activity on _____.

Pursuant to the results of this leak test, the following action is recommended:

☐ Analysis indicated 0.005 microcurie or more of radioactivity on the leak test specimen. Immediately withdraw the source from use. Decontaminate and repair it or conduct disposal in accordance with applicable regulations. File a report with the regulatory agency within the time period prescribed.

☐ Analysis indicated less than 0.005 microcurie of radioactivity on the leak test specimen. The sealed source may be used as authorized. This source must be leak tested again, on or before _____or within any such time period required by the regulatory agency.

*This certificate is an essential record and should be maintained for inspection by the regulatory agency.*

CERTIFICATE NO._____

BY: _____

DATE: _____

DESIGNER AND MANUFACTURER
OF
Scientific and Industrial
INSTRUMENTS

LUDLUM MEASUREMENTS, INC.
915 · 235-5494 TELEX No. 499832 UD
POST OFFICE BOX 810
501 OAK STREET
SWEETWATER, TEXAS, U.S.A. 79556

# CERTIFICATE OF CALIBRATION

Customer KAY RAY, INC.

Order No. 84-3029

Mfg. LMT Model 3 Serial No. 37630

Mfg. — Detector Model — Serial No. —

Cal. Date 3-15-86 Cal. Due 3-15-87 Temperature 74 °

Cal. Interval 1 YEAR Procedure: In accordance with Mfg. Specs. Humidity 38 %

| INSTRUMENT RECEIVED | INSTRUMENT RETURNED |
|---|---|
| ☐ Within tolerance | ☐ Input sensitivity threshold set for 1.00 = _____ MV |
| ☐ Out of tolerance | ☐ Detector operating voltage = _____ volts |
| ☐ Requiring repair | ☑ See comments |

COMMENTS

NEW

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Bureau of Standards, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants, or have been derived by the ratio type of self-calibration techniques. The calibration system conforms to the requirements of MIL-STD-45662A and ANSI N323-1978.

## CALIBRATION EQUIPMENT

| Manufacturer | Model Number | Serial Number | Accuracy |
|---|---|---|---|
| Ludlum | 500 | 24797 | Mfg. Specs. |
| B&K | VOM | A5099 | Mfg. Specs. |
| B&K | Oscilloscope | 05542 | Mfg. Specs. |
| | | | |

## CALIBRATION RANGE

☐ Cs137 Gamma traceable to NBS TFN 224008, Oct. 2, 1980, 142Mr/HR @ 1 meter

☐ Neutron Am-241/Be traceable to NBS Certification Test 223767, Aug. 21, 1980

☑ Electronic Calibration ☐ Alpha _____ ☐ Beta _____

☐ Other

Calibrator Elaine Wyatt Supervisor Keith D. Brock

Date 3-15-86 Quality Control Gloria Torres

03029281

BETWEEN: William O. Miller, Chief
License Fee Management Branch
Office of Administration

John E. Glenn, Chief
Nuclear Materials Section B
Division of Engineering and
Technical Programs

LICENSE FEE TRANSMITTAL

A. REGION I

1. APPLICATION ATTACHED

Applicant/Licensee: Neville-Synthese Organics, Inc.

Application Dated: 5/13/86

Control No.: 105567

License No.: New

2. FEE ATTACHED

Amount: $230.00

Check No.: 001233

3. COMMENTS

Signed Brenda Klatchke

Date 6/28/86

B. LICENSE FEE MANAGEMENT BRANCH

1. Fee Category and Amount: 3P ($230)

2. Correct Fee Paid. Application may be processed for:

Amendment _____

Renewal _____

License ✓

Signed M. Thessin

Date 6/5/86

NRC I FORM 213
(OCH 1983)

# RSO COURSE OUTLINE AND SCHEDULE

MONDAY

| | Lecture # | Topics |
|---|---|---|
| 8:30-10:00 a.m. | | Introductions, descriptions of course, and distribution of training materials. |
| 10:00-11:00 a.m. | 1 | Natural Radioactivity & Environmental Sources of Radiation |
| 11:00-12:00 p.m. | 2 | Applications of Radiation and Radioactivity |
| 12:00-1:00 p.m. | | LUNCH |
| 1:00-2:00 p.m. | 3 & 4 | History of Adverse Effects of Radiation and the Philosophy of Radiation Control |
| 2:00-3:00 p.m. | 5 | Safety Standards and Regulatory Control of Ionizing Radiation |
| 3:00-3:30 p.m. | | COKE BREAK |
| 3:30-4:30 p.m. | 6 | Units, Terms and Definitions & Organizing and Operating Radiation Safety Programs |
| 4:30-5:00 p.m. | | Review and Discussion<br>Schedule private review of your radiation safety program. |

TUESDAY

| | | |
|---|---|---|
| 8:00-8:30 a.m. | | QUIZ #1 |
| 8:30-9:00 a.m. | | Videotape #1 - "A is for Atom" |
| 9:00-10:30 a.m. | 7 | Atomic and Nuclear Structures and Radioactivity |
| 10:30-10:45 a.m. | | COFFEE OR TEA BREAK |
| 10:45-12:00 p.m. | 8 | Radioactivity and Ionizing Radiation |
| 12:00-1:00 p.m. | | LUNCH |
| 1:00-2:30 p.m. | 9 | Interaction of Radiation with Matter |
| 2:30-2:45 p.m. | | COKE BREAK |
| 2:45-5:00 p.m. | 11 | Radiation Shielding and Use of Inverse Square Law |

RSO COURSE OUTLINE AND SCHEDULE

WEDNESDAY

| | Lecture # | Topics |
|---|---|---|
| 8:30-9:00 a.m. | | Quiz #2 |
| 9:00-10:30 a.m. | 10 | Instrumentation for the Detection and Measurement of Ionizing Radiation |
| 10:30-10:45 a.m. | | COFFEE OR TEA BREAK |
| 10:45-12:00 p.m. | 12 | Biological Effects of External Radiation |
| 12:00-1:00 p.m. | 13 | Biological Effects of Internal Radiation |
| 1:00-2:00 p.m. | | LUNCH |
| 2:00-3:15 p.m | 15 | Personnel Monitoring |
| 3:15-4:30 p.m. | 16 | Audit, Evaluation & Control of Radiation Risks |
| 4:30-5:00 p.m. | | Video Tapes |

THURSDAY

| | | |
|---|---|---|
| 8:30-9:00 a.m. | | Quiz #3 |
| 9:00-10:30 a.m. | 17 | Documentation and Effective Management of a Radiation Safety Program |
| 10:30-10:45 a.m. | | COFFEE OR TEA BREAK |
| 10:45-12:00 p.m. | 18 | Management of Emergencies, Incidents & Crises |
| 12:00-1:00 p.m. | | LUNCH |
| 1:00-2:00 p.m. | 19 | Packaging, Transporting & Disposing Radioactive Materials |
| 2:00-2:15 p.m. | | COKE BREAK |
| 2:15-3:15 p.m. | | Introduction to Nonionizing Radiation |
| 3:15-5:00 p.m. | 20A | Optical Radiation |

RSO COURSE OUTLINE AND SCHEDULE

FRIDAY

| | Lecture # | Topics |
|---|---|---|
| 8:30-9:30 a.m. | 21 | Radiofrequency and Microwave Radiation Measurement and Control |
| 9:30-9:45 a.m. | | COFFEE OR TEA BREAK |
| 9:45-11:00 a.m. | 20B | Laser Safety |
| 11:00-12:00 p.m. | 22 | Ultraviolet, Ultrasound and Infrared Measurement and Control |
| 12:00-1:00 p.m. | | LUNCH |
| 1:00-2:00 p.m. | | Summary and Distribution of Final Exams |