



Thursday, February 15, 2007

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RECEIVED
REGION 1

Ms. Betsy Ullrich,
Senior Health Physicist
USNRC Region I Office
475 Allendale Road
King of Prussia, PA 19406-1415

RE: License No.: 37-31218-01
Docket No: 030-37401
Control No: 140031

Dear Ms. Ullrich,

Per your request, please see below for the additional information you requested in your correspondence dated February 14, 2007 regarding the above referenced license application:

- a. Describe the control over the radiation safety program that will be delegated so that the consultant-RSO will be able to exercise authority over authorized users when confronted with radiation safety problems that require implementation of corrective actions.

The RSO job function will have the same authority regardless if they are a Lancer Systems employee or a consultant. The language in the Radiation Safety Program and ALARA policy have been modified to reflect this delegation in authority as identified below. A copy of the revised document is attached.

LS101Radiation Safety Manual RSO definition page 4
Section 5.2.1 page 4
ALARA Policy Page 11 Item B

- b. Describe the relationship that will exist between the consultant-RSO and your institutional management regarding expenditure of funds to facilitate the objectives of your radiation safety program and related regulatory requirements.

Lancer Systems has contracted with Anne M. Stumpf to be their consultant RSO because of her experience and knowledge implementing radiation safety programs with these devices and radioactive materials for over four years. Her role is important in establishing the Radiation Safety Program at its inception. Accordingly, Lancer Systems has issued a Purchase Order to cover the expenditures in support of the consulting services. A copy of the purchase order is attached.

- c. Identify other commitments of the consultant-RSO for other NRC or Agreement State licensed facilities, along with a description of how the consultant-RSO will allocate time to permit the performance of the duties of the RSO as described in the regulations. State the consultant-RSO's minimum amount of on-site time (for example, hours per week).

Currently Anne M. Stumpf serves as RSO for a licensed facility that requires sixteen hours per month of onsite support. The licensed facility conducts repair on the same types of devices and radioactive materials listed in the license application.

A description of the program schedule is attached that outlines the project tasks that will require the RSO to be present on site. This includes onsite training of personnel for two weeks and receipt of radioactive materials. In addition, the consultant RSO will spend a minimum of 24 hours per month onsite to perform the duties as required by the regulations.

- d. **Appoint an in-house representative who will serve as the point of contact during the RSO's absence. This person may be allowed to assist the consultant RSO with limited authority.**

Glenn Ward will be the point of contact during the RSO's absence. Glenn Ward will be trained by the RSO on the responsibilities of the RSO and emergency procedures. It is Lancer Systems intent to have Glenn Ward and/or another designee to be trained as a Radiation Officer in the future.

- e. **Describe the overall availability of the consultant-RSO to respond to questions or operational issues that arise during the conduct of your radiation safety program and related regulatory requirements. Specify the maximum amount of time it will take the RSO to arrive at the facility in the event of an emergency that requires his presence.**

The consultant RSO is available by cell phone during normal working hours when not on site to respond to questions or operational issues and during off hours for emergencies. The Point of Contact or Assistant RSO will be responsible for communicating to the RSO during an emergency and will act under the direction of the RSO until the RSO arrives onsite. The maximum amount of time that it would take for the RSO to arrive onsite in case of an emergency would be six hours.

Please feel free to contact Brian Hodges, President, at 215-256-9521 ext. 1701, Glenn Ward at (803)443-8283 or Ms. Anne Stumpf, project consultant at (352) 455-2354, if you have any questions about this request.

Sincerely,



Brian Hodges
President – Lancer Systems

RADIATION SAFETY MANUAL
STANDARD OPERATING PROCEDURE
LS-101 REVA

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1. INTRODUCTION

The use of radioactive materials poses unique health hazards and risks to the workplace and to the environment, which need to be identified and controlled. Through the identification of the hazards and use of these materials safe work practices can be established to minimize risk and prevent exposure to these materials. The specific requirements for the use of radiation are established by the United States Nuclear Regulatory Agency (NRC) and any agreement state.

2. PURPOSE

The purpose of this program is to establish a means by which the use of Radioactive Materials may effectively be identified, addressed and managed to prevent over exposure.

The goals of the Radiation Protection Program are to:

- Establish procedures for the review of programs that may require the use of radioactive materials and identify regulatory requirements
- Establish minimum procedures that must be followed to reduce the potential for exposure to radiation.
- Identify minimum training requirements and monitoring requirements for employees that handle radioactive materials.
- Provide additional guidance regarding radiation safety in accordance with the requirements outline in *Lancer Systems Safety Manual*.

3. SCOPE

This document applies to all employees and operations at all locations of Lancer Systems.

4. DEFINITIONS

Agreement State – any state with which the U.S. Nuclear Regulatory Commission or the U.S. Atomic Energy Commission has entered into an effective agreement under subsection 274b of the Atomic Energy Act of 1954 as amended. Agreement state regulations have determined requirements for the state.

Dose – absorbed dose or dose equivalent, a measure of radiation exposure

Personnel Monitoring Equipment – devices such as film badges, pocket dosimeters and thermo luminescent dosimeters designed to be worn or to be

carried by an individual for the purpose of estimating the dose received by the individual.

Radiation Area – any area accessible to individuals in which there exists radiation at such levels where a potential for exposure could occur.

Radiation Safety Officer (RSO) – a person who has the knowledge and responsibility to apply appropriate radiation protection regulations and the delegated authority to enforce safe radiation safety procedures. The RSO may be a Lancer System employee or a consultant acting as an RSO on Lancer Systems behalf.

Radioactive Material – any solid, liquid or gas which emits radiation spontaneously.

5. RESPONSIBILITIES

5.1 Supervisors/Managers have the responsibility to:

- 5.1.1 Ensure that employees under their direction that work with radioactive materials have received Radiation Safety Training as described in this procedure, prior to conducting their work tasks.
- 5.1.2 Ensure concerns related to radiation safety are investigated and addressed in a timely manner.
- 5.1.3 Monitor employees under their direction to assure safe work practices are followed.
- 5.1.4 Notify the RSO whenever new radioactive materials are being considered to be used in the facility prior to these materials being brought into the facility.
- 5.1.5 Include a review of potential radiation exposures hazards during the initial stages of program planning.

5.2 The Radiation Safety Officer and Assistant Radiation Safety Officer shall:

- 5.2.1 Have the delegated authority to ensure that all terms and conditions of the license and the regulations are complied with.
- 5.2.2 Ensure that all sealed sources and devices are leak tested timely and as prescribed by the manufacturer or license.
- 5.2.3 Ensure that the radioactive materials are used only by the individuals who are authorized by the license and that all affected personnel wear monitoring devices, where required.

- 5.2.4 Maintain all records required by the license and the regulations. These records shall include personnel monitoring records, leak test records, inventory records, training records for users, and receipt, transfer and disposal records.
- 5.2.5 Ensure that radioactive materials are properly secured against unauthorized access or removal.
- 5.2.6 Serve as a contact with the NRC for events such as the loss, theft or damage of radioactive material
- 5.2.7 Ensure that all users understand the emergency reporting procedures and serve as a point of contact with the regulatory agency for such events as theft or loss of radioactive materials.

5.3 Employees are responsible for:

- 5.3.1 Following rules and guidelines established as part of the radiation safety program.
- 5.3.2 Promptly reporting all injuries, illnesses or potential radiation problems to the RSO or Assistant RSO.
- 5.3.3 Wearing appropriate personnel monitoring devices as required.

6. PROCEDURES

6.1 License Requirements

- 6.1.1 A license to possess radioactive materials is required prior to working with any radioactive materials depending on the radioactive materials involved
- 6.1.2 Requirements for obtaining a license and the applicability of a license are regulated by Nuclear Regulatory Commission or an agreement state.
- 6.1.3 Once issued, the conditions of the license will indicate the types of radioactive materials, approved activities and the radiation safe work practices for work with the materials.
- 6.1.4 The Radiation Safety Manual includes the specific requirements and procedure that are required as conditions of the license.
- 6.1.5 The principle of ALARA (As Low As Reasonably Achievable) is the basis for the Lancer Systems radiation safety program. ALARA obligates the RSO to conduct the safety program in such a way as to minimize personnel radiation exposure. An annual ALARA report will be submitted to all authorized users and Management. The written ALARA policy is found in Attachment 1.

6.2 General Safe Practices and License Conditions

- 6.2.1** Written procedures will be established that include the safe practices for handling radiation materials, monitoring of personnel, storage and inventory and any other specific conditions for the license. Procedures for the Control of Radioactive Materials are described in SOP LS-106 Control of Radioactive Material.
- 6.2.2** Appropriate recordkeeping procedures will be maintained to include radioactive materials inventory, results of wipe and leak tests, personnel monitoring records, shipping and receiving records, and any emergency response activities.
- 6.2.3** Any Radiation Controlled area or equipment containing radioactive materials will be designated with yellow and purple signs and/or labels as described in SOP LS-106 Control of Radioactive Material.
- 6.2.4** Any person who possesses or works in the vicinity of radioactive materials shall wear a personnel-monitoring device, as appropriate, in accordance with the regulatory requirements. When not being used personnel monitoring devices should be stored in a place designated by the RSO as a low background area.
- 6.2.5** The permissible occupational radiation dose to the whole body is limited to the exposure limits as specified in the regulatory requirements. Records of all monitoring will be maintained and information regarding any over exposure results will be communicated to the employee in writing.
- 6.2.6** Radiation monitoring equipment such as scintillation counters and Geiger counters must be calibrated following the manufacturer requirements as described in SOP LS-103 Radiation Surveys. A sticker of the current calibration must be displayed on the monitoring device.
- 6.2.7** Disposal materials that are potentially contaminated with radioactive materials must be segregated from other waste and placed in containers marked for radioactive waste. Specific procedures for the handling and disposal of waste are outlined in SOP-LS-105.
- 6.2.8** Emergency information and procedures must be posted in all areas where radioactive materials are being used. This information (see Attachment 2) must include the name and emergency number of the RSO. Emergency Procedures are outlined in SOP-LS-100.
- 6.2.9** Notices to Employees, Emergency Procedures, Operating Procedures and Notices of Violations shall be posted in all radioactive material work areas. License, amendments and copies of NRC regulations are on file in Radiation Safety Officer and the Program Manager's office.

- 6.2.10 A sign indicating "Radioactive Materials" (see Attachment 2) must be posted on the door to any radiation controlled area. No eating or drinking is allowed in these rooms.
- 6.2.11 The shipping or radioactive materials must follow applicable DOT requirements and any other specifications that are indicated in the license and the governing regulatory agency. Shipping and Receiving procedures are outlined in SOP-LS-104 and SOP-LS-102.

7. TRAINING REQUIREMENTS

- 7.1 All Employees that may work with radioactive materials or in a radiation controlled area shall receive initial general radiation training on the hazards and safe work practices related to the use or radioactive materials prior to beginning work with radiation. Personnel that would receive this training include authorized users and trained technicians.
- 7.2 The Radiation Safety Officer and Authorized Users must have sufficient documented radiation Safety training and hands on experience with handling radioactive materials. Previous experience as a Radiation Safety officer or Authorized User may be used to meet this *requirement*. This training may include the following: principles and practices of radiation protection, radioactivity measurement, monitoring techniques and the use of instruments, mathematics and calculations basic to the use and measurement of radioactivity, and biological effects of radiation.
- 7.3 The employee's general radiation training will include both lecture and video presentation (see Attachment 3) and will cover (but not be limited to) the following topics:
- Storage, transfer or use or radioactive materials in the facility.
 - Health risks associated with exposure to radiation and the precautions and procedures to minimize such exposures.
 - Explanation of monitoring devices and equipment to determine radiation exposures
 - An explanation of an employee's responsibilities to report promptly to the Radiation Safety Officer any condition that may cause a violation of the facilities license or potential over exposure to radiation.
 - Emergency response procedures and reporting for any unusual events.
 - Advised to the annual radiation monitoring reports that radiation workers will be provided
 - Proper disposal of RAM
 - Written examination of understanding following the training
- 7.4 Employees will receive annual refresher training, which will include a review of the safe work practices, hazards and regulatory requirements.

- 7.5 Additional training may be required based on individual state or local authority requirements or if a change in procedures or equipment is made. Remedial training for missed test questions or other areas of apparent weakness should be conducted or additional formal training planned to cover deficient areas.
- 7.6 Hazardous **Materials Training** will be conducted for all employees whose duties require them to receive, handle, or prepare hazardous materials for transportation. The requirements of this training are as follows:
- 7.6.1 General Awareness training/familiarization training designed to provide familiarity with 49 CFR requirements and to enable the employee to recognize and identify hazardous materials.
- 7.6.2 Function Specific training concerning USDOT requirements which are specifically applicable to the functions the employee performs.
- 7.6.3 Safety training concerning emergency response information, measures to protect the employee from hazards posed by materials and the methods a procedures for avoiding accidents.
- 7.6.4 Training will be conducted prior to the employee performing transportation duties on hazardous material or within 90 days of employment.
- 7.6.5 Training will be conducted every 3 years.
- 7.6.6 Training records will be maintained for the duration of employment plus 90 days.
8. **PERSONNEL MONITORING – Dosimetry**
- 8.1 A whole body dosimeter must be worn by any individual when handling sealed sources and assembly of drift tubes or chemical detectors in the controlled areas. Whole body dosimeters will be exchanged quarterly.
- 8.2 A ring (extremity) dosimeter must worn by any individual dismantling chemical detectors or handling sources in the controlled area. Extremity dosimeters will be exchanged monthly.
- 8.3 It is the responsibility of a pregnant woman to declare her pregnancy to the RSO if she wishes to have additional measures taken to insure that fetal dose limits are not exceeded. Where applicable fetal monitors will be exchanged monthly.
- 8.4 The procedures for personnel in the dosimetry program include:
- 8.4.1 Wear badge whenever working with radiation sources.
- 8.4.2 Badge must face outward.

- 8.4.3 Keep badges at work in designated area away from x-ray producing machines and sources.
- 8.4.4 Do not wear during medical tests.
- 8.4.5 Never use another worker's badge. If badge is lost or damaged, a spare can be issued through the RSO.
- 8.4.6 Wear whole body badges on the torso, at or above the waist and below the shoulder.
- 8.4.7 The ring badges should be worn under the glove on the hand that is more likely to receive radiation exposure.
- 8.4.8 Badges should be stored in an area designated by the RSO. They should be stored with the control badge if possible and protected from moisture and extreme environmental conditions, such as intense heat or light, which may affect their ability to accurately record radiation exposures.
- 8.4.9 The RSO or designee will change out the badges when required.
- 8.5 The RSO will notify personnel in writing when exposure readings exceed ALARA action levels.
- 8.6 Employees that participate in a personnel-monitoring program will be notified of the results of their monitoring on an annual basis.

9. RECORDKEEPING

- 9.1 Appropriate recordkeeping procedures will be maintained to include radioactive materials inventory, results of wipe and leak tests, personnel monitoring records, shipping and receiving records, and any emergency response activities.
- 9.2 Retention for records associated with the Radiation Program are found in the below table:

Program Element	Record Retention
Radioactive Materials inventory	3 years
Results of Wipe and Leak Tests	3 years
Personnel Monitoring Records	Permanent
Shipping and Receiving Records	3 years
Personnel Training Records	Duration of employment plus 90 days
Emergency Response Activities	3 years

10. SECURITY AND EMERGENCIES

- 10.1** Lancer Systems operates under a badge system that requires all individuals in the facility to wear the badge at all times. Employees are issued badges including key card access based on their level of security clearance following Lancer Systems general Security Manual Procedures.
- 10.2** The entire building is secured with an alarm system that is monitored 24 hours a day. Access to the building is restricted to employees only using card key access. Restricted and classified areas are also key card access only to those individuals that are trained. Additional key card access is required to enter the restricted areas of the Source and Secure Storage areas and is restricted to authorized trained users.
- 10.3** All incoming visitors are required to sign-in and are given a badge at the reception desk. Visitors are continuously escorted at all times.
- 10.4** Emergency egress doors located in the regulated area are equipped with emergency alarms that sound immediately when they are opened.
- 10.5** The procedures to control of access to radioactive materials moved throughout the facility are described in SOP-LS-106 Control of Radioactive Materials.
- 10.6** Emergency procedures are outlined in SOP-LS-100 Emergency Response.

11. ASSOCIATED FORMS OR DOCUMENTS

SOP-LS-106 Control of Radioactive Material
SOP-LS-104 Shipment of Radioactive Material
SOP-LS-102 Receipt of Radioactive Materials
SOP-LS-100 Emergency Response
SOP-LS-103 Routine Radiological Surveys
SOP-LS-105 Waste Disposal of Radioactive Material
SOP-LS-107 Lancer Systems Safety Manual
SOP-LS-108 Lancer Systems Security Manual

12. INTERPRETIVE AUTHORITY

The interpretive authority for all questions concerning this document shall be the RSO or Program Manager.

13. REFERENCE DOCUMENTS

US Nuclear Regulatory Commission Regulations – 10 CFR

ATTACHMENT 1
Lancer Systems
ALARA POLICY

1. THE ALARA PHILOSOPHY

The Nuclear Regulatory Commission, establishes standards for protection against radiation hazards. 10 CFR 20.1101(b)., requires licensees to use to the extent practical procedures and engineering controls based upon sound radiation protection principles to achieve occupational and public doses that are as low as reasonably achievable (ALARA). Management, the radiation safety officer (RSO) and all authorized users must participate in the establishment, implementation and operation of a radiation protection program which applies the ALARA philosophy of minimizing exposures to radiation.

The primary concept of the ALARA philosophy is that unnecessary exposure to radiation should be avoided, even though current occupational exposure limits provide a very low risk of injury. The objective is to reduce occupational exposures (both individual and collective) as far below regulatory limits as is reasonably achievable by means of good radiation protection planning and practice, as well as by a management commitment to policies that deter departures from good practices. The three primary methods of minimizing exposure to radiation are: TIME, DISTANCE and SHIELDING. When working with sources of radiation, always minimize the TIME, maximize the DISTANCE, and make use of available SHIELDING to keep exposures ALARA.

2. MANAGEMENT COMMITMENT

We, the management of **Lancer Systems** are committed to the ALARA philosophy of maintaining occupational and public radiation doses as low as reasonably achievable.

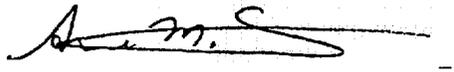
- A. It will be a management priority that all personnel working with radioactive material be made aware of our commitment to the ALARA philosophy and that they be instructed in the procedures to be used to keep their exposures as low as possible.
- B. Management has delegated authority to our RSO,(either employee or RSO Consultant) to ensure adherence to ALARA principles. Management will support the RSO in instances where this authority must be asserted.
- C. Management will make all reasonable modifications to procedures, equipment and facilities to reduce exposures, unless the cost is considered to be unjustified. We will be prepared to describe the reasons for not implementing modifications that have been recommended.

3. RADIATION SAFETY OFFICER RESPONSIBILITIES

- A. The RSO will emphasize the ALARA philosophy to all personnel working with radioactive material, and will instruct workers to review current procedures and propose changes to reduce exposure levels.
- B. If personnel monitoring is conducted, the RSO will review dosimetry reports for all monitored personnel upon receipt (monthly for film badges or quarterly for TLDs) to determine if unnecessary exposures are being received. The RSO will sign and date each report reviewed. The RSO will investigate within 30 days the cause of any personnel exposure considered to be excessive. If warranted, the RSO will take corrective actions to ensure that unnecessary exposures are halted and recurrence is prevented. A report of each investigation and the actions taken, if any, will be recorded and maintained for inspection purposes.

- C. At least annually, the RSO will conduct a formal review of the radiation protection program's content and implementation, as required by 10 CFR 20.1101(c). The review will include an evaluation of equipment, procedures, inspection findings, and any incidents. The RSO will assess trends in occupational exposures as an index of the program's success and to determine if any modifications to the program are needed. A summary of the results of each annual review, including a description of actions proposed and taken (if any) will be documented by the RSO, discussed with management, and signed and dated by both. A report on each audit will be maintained on file for 3 years from the date of the review.

The undersigned certify that the commitments set forth above have been implemented.



signature (RSO)

Anne M. Stumpf, CIH, CSP
Name and title



Signature (management)

Brian Hodges, President Lancer Systems LP
Name and title

ATTACHMENT 2

**In The Event Of Accident,
Damage, Loss, Theft, Spill,
Or Contamination Involving**

**RADIOACTIVE MATERIALS
IMMEDIATELY NOTIFY**

Licensee's Radiation Safety Officer: Anne M. Stumpf RSO Glenn Ward Asst. RSO	Duty [REDACTED] Anne's Cell [REDACTED] Glenn's Cell
	After Duty: 352-455-2354

**For NRC Radiation Emergency
Notification Or Assistance Call:**

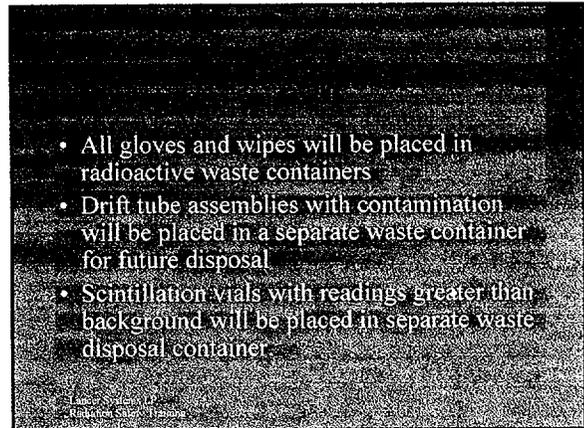
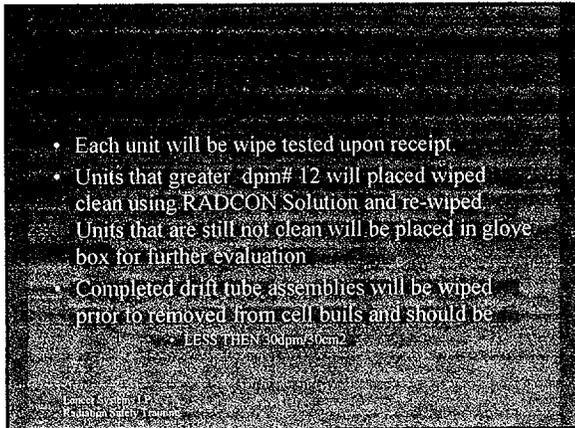
**NRC Headquarters Operations Center (301) 816-5100*
Monitored 24 hours a day**

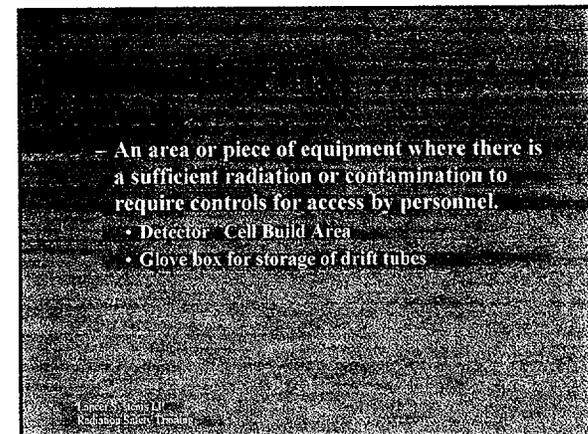
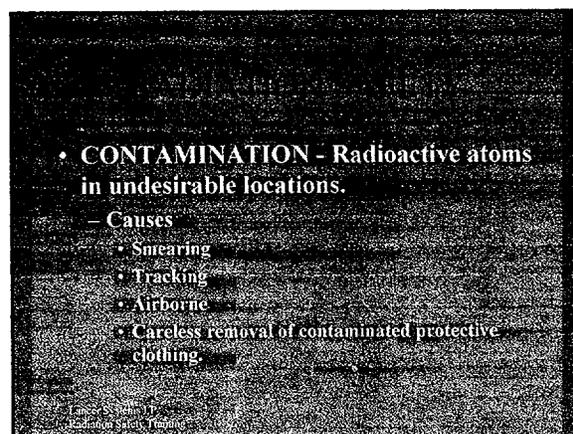
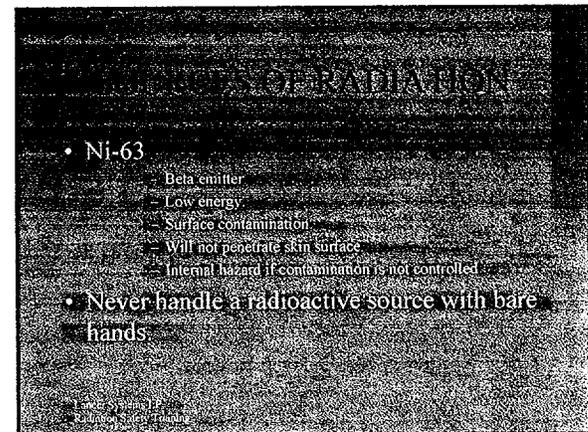
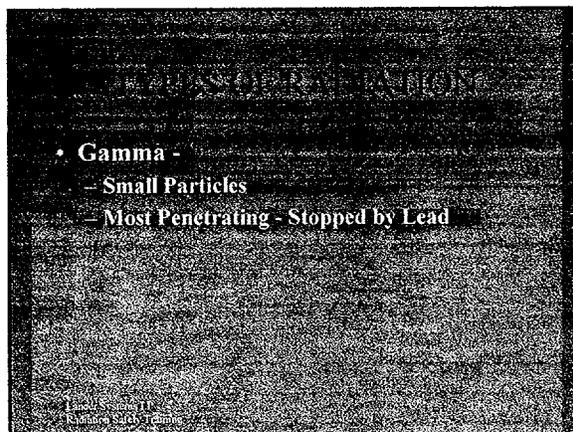
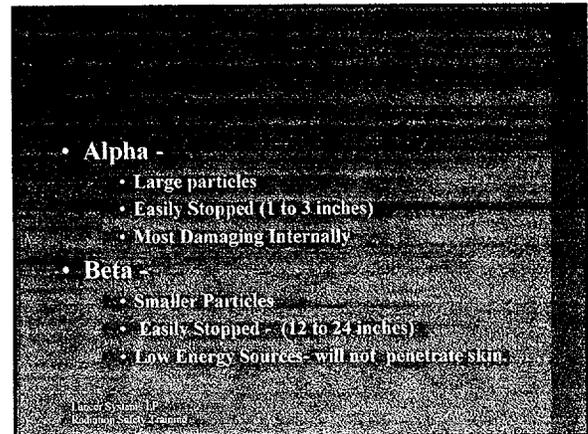
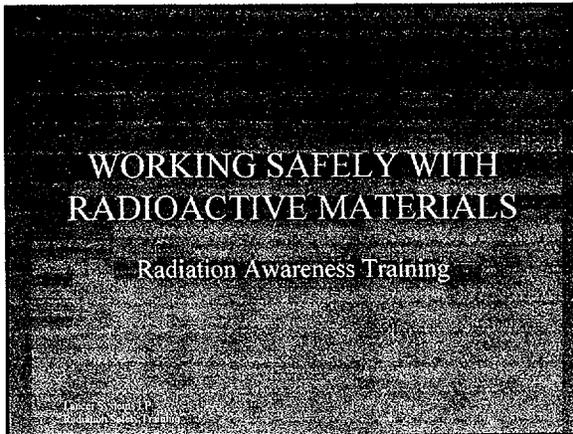
In the event of suspected contamination:

1. SEAL OFF CONTAMINATED AREA, CLOSE WINDOWS, DOORS, AND VENTILATION TO OTHER AREAS.
2. LIMIT ACCESS TO CONTAMINATED AREAS, KEEP PEOPLE OUT!
3. DO NOT TRACK RADIOACTIVITY THROUGHOUT THE BUILDING REMEMBER YOUR SHOES AND CLOTHING MAY BE CONTAMINATED!

**PERSONAL INFORMATION WAS REMOVED
BY NRC. NO COPY OF THIS INFORMATION
WAS RETAINED BY THE NRC.**

ATTACHMENT 3
Lancer Systems
Radiation Safety Training Materials





- Exposure records will be kept on all personnel working in Radiation Areas.
 - Occupational Dose Limits for Adults:
 - Total Body - 5 Rem
 - Eye - 15 Rem
 - Shallow - 50 Rem
- Lancer Systems LP
Radiation Safety Training

- Luxel Badges
 - Changed out:
 - Quarterly High Sensitivity
 - Visual Body Location Icons
 - Extremity badges & whole body badges
 - Wear at all times in controlled areas
 - Do not allow anyone else to wear your badge
 - Keep badge in designated area when not in use
- Lancer Systems LP
Radiation Safety Training

- ALARA - As Low As Reasonably Achievable
 - Written policy to prevent over exposure
 - Limits Per Calendar Quarter
 - Whole Body - 125 mrem
 - Eye - 375 mrem
 - Skin or extremity - 1250 mrem
- Lancer Systems LP
Radiation Safety Training

- BETA Probe
 - Geiger-Muller Detector (G-M)
 - Liquid Scintillation Counters
 - Film Badges and Rings
- Lancer Systems LP
Radiation Safety Training

- Only authorized personnel will be permitted to enter Cell Build Areas.
 - Persons suffering with the following conditions will not enter the cell build room:
 - large cuts
 - colds or allergies
 - eye, nose or throat infections
 - skin infections
 - Monitoring badges will be worn
- Lancer Systems LP
Radiation Safety Training

- There will be no smoking, eating, drinking any beverage, or gum chewing in the Controlled areas
 - Approved gloves and smocks will be worn by personnel handling Radioactive Material
 - Gloves will be worn whenever Radioactive material will be handled
 - Dispose of contaminated gloves in proper container
- Lancer Systems LP
Radiation Safety Training

- Change them frequently.
- Remember that if your gloves are contaminated whatever you touch will also be contaminated.
- No protective gear will be worn away from the Cell Build Room.
- Always wash hands immediately, and thoroughly, after every handling period.

Lancer Systems LP
Radiation Safety Training

- No tools will be removed from cell build room.
- Prior to leaving area, check hands with survey meter for any contamination.
- If contamination is found do not panic.
- Call RSO or alternate. (Anne Stumpf or Glenn Ward)
- Do not leave area.

Lancer Systems LP
Radiation Safety Training

WIPING PROCEDURE

- Will only be performed by knowledgeable personnel.
- This should be done during the week on all work surfaces prior to end of:
 - Work Cycle
- Log wipe tests after completion
- Follow SOP 5.0 procedures

Lancer Systems LP
Radiation Safety Training

WIPING PROCEDURE

- Wipe entire surface of item being checked.
- Use medium pressure.
 - Do not use so much pressure as to decimate wipe.
- Place all vials in proper location after testing.

Lancer Systems LP
Radiation Safety Training

- **DRIFT TUBE ASSEMBLY**
 - LESS THEN 30dpm/30cm²
- **ICAM**
 - LESS THEN 100dpm/100cm²
 - (ICAM IS APPROX 1200 cm²)
 - dpm# /12
- **TABLE AND ROOM WIPE TEST**
 - LESS THEN 100dpm/100cm²
 - wipe test template = 1850 cm² (dpm# /18.50)

NOTE: 100cm² = 4 INCHES x 4 INCHES

Lancer Systems LP
Radiation Safety Training

- Drift tubes are not to be disassembled to expose radioactive sealed source outside the cell build room.
- All parts that have been in contact with radioactive source are to stay in the Cell Build Room until final disposition.
- Parts that are to be reworked must be cleaned and wipe tested before leaving Cell build Room.

Lancer Systems LP
Radiation Safety Training

WORKING SAFELY WITH RADIOACTIVE MATERIALS

Radiation Awareness Training

Lancer Systems LP
Radiation Safety Training

ALPHA PARTICLES

- **Alpha -**
 - Large particles
 - Easily Stopped (1 to 3 inches)
 - Most Damaging Internally
- **Beta -**
 - Smaller Particles
 - Easily Stopped - (12 to 24 inches)
 - Low Energy Sources - will not penetrate skin.

Lancer Systems LP
Radiation Safety Training

GAMMA PARTICLES

- **Gamma -**
 - Small Particles
 - Most Penetrating - Stopped by Lead

Lancer Systems LP
Radiation Safety Training

SOURCES OF RADIATION

- **Ni-63**
 - Beta emitter
 - Low energy
 - Surface contamination
 - Will not penetrate skin surface
 - Internal hazard if contamination is not controlled
- **Never handle a radioactive source with bare hands**

Lancer Systems LP
Radiation Safety Training

RADIATION CONCEPTS

- **CONTAMINATION - Radioactive atoms in undesirable locations.**
 - Causes
 - Smearing
 - Tracking
 - Airborne
 - Careless removal of contaminated protective clothing

Lancer Systems LP
Radiation Safety Training

RADIATION ZONES

- **An area or piece of equipment where there is a sufficient radiation or contamination to require controls for access by personnel.**
 - Detector - Cell Build Area
 - Glove box for storage of drift tubes

Lancer Systems LP
Radiation Safety Training

PERSONNEL RECORDS

- Exposure records will be kept on all personnel working in Radiation Areas.
- Occupational Dose Limits for Adults:
 - Total Body - 5 Rem
 - Eye - 15 Rem
 - Shallow - 50 Rem

Lancer Systems LP
Radiation Safety Training

PERSONNEL RECORDS

- Luxel Badges
 - Changed out
 - Quarterly High Sensitivity
 - Visual Body Location Icons
 - Extremity badges & whole body badges
 - Wear at all times in controlled areas
 - Do not allow anyone else to wear your badge
 - Keep badge in designated area when not in use

Lancer Systems LP
Radiation Safety Training

ALARA PROGRAM

- ALARA - As Low As Reasonably Achievable
 - Written policy to prevent over exposure
- Limits Per Calendar Quarter:
 - Whole Body - 125 mrem
 - Eye - 375mrem
 - Skin or extremity - 1250 mrem

Lancer Systems LP
Radiation Safety Training

RADIATION MEASUREMENT

- BETA Probe
- Geiger-Muller Detector (G-M)
- Liquid Scintillation Counters
- Film Badges and Rings

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RESTRICTED AREAS

- Only authorized personnel will be permitted to enter Cell Build Areas.
- Persons suffering with the following conditions will not enter the cell build room:
 - loose cuts
 - colds or allergies
 - eye, nose or throat infections
 - skin infections
- Monitoring badges will be worn

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RESTRICTED AREAS

- There will be no smoking, eating, drinking any beverage, or gum chewing in the Controlled areas
- Approved gloves and smocks will be worn by personnel handling Radioactive Material.
- Gloves will be worn whenever Radioactive material will be handled.
- Dispose of contaminated gloves in proper container

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WIPING GLOVES

- Change them frequently
- Remember that if your gloves are contaminated whatever you touch will also be contaminated
- No protective gear will be worn away from the Cell Build Room.
- Always wash hands immediately, and thoroughly, after every handling period

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CELL BUILD ROOM

- No tools will be removed from cell build room
- Prior to leaving area, check hands with survey meter for any contamination.
- If contamination is found do not panic.
- Call RSO or alternate. (Anne Stumpf or Glenn Ward)
- Do not leave area

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WIPING SURFACES PRIOR TO END OF WORK CYCLE

- Will only be performed by knowledgeable personnel
- This should be done during the week on all work surfaces prior to end of:
Work Cycle
- Log wipe tests after completion
- Follow SOP 5.0 procedures

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WIPING SURFACES AS NECESSARY

- Wipe entire surface of item being checked.
- Use medium pressure.
 - Do not use so much pressure as to decimate wipe
- Place all vials in proper location after testing

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WIPING THRESHOLDS

- **DRIFT TUBE ASSEMBLY**
LESS THEN 300dpm/30cm²
- **ICAM**
LESS THEN 100dpm/100cm²
(ICAM IS APPROX 1200 cm²)
dpm/12
- **TABLE AND ROOM WIPE TEST**
LESS THEN 1000dpm/100cm²
Wipe test template = 1850 cm² (dpm/18.50)

NOTE: 100cm² = 4 INCHES x 4 INCHES

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DISASSEMBLY OF DRIFT TUBES

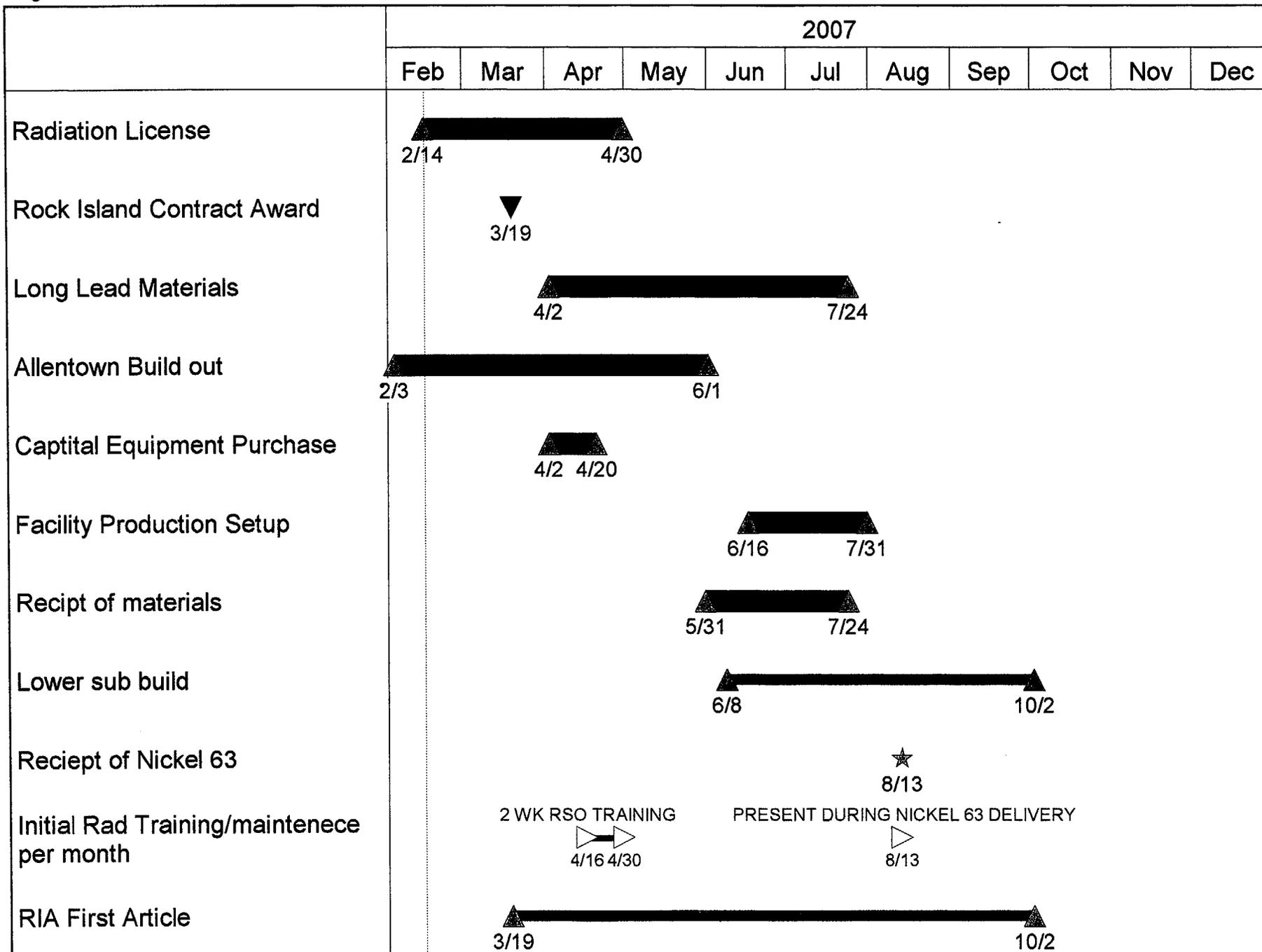
- Drift tubes are not to be disassembled to expose radioactive sealed source outside the cell build room.
- All parts that have been in contact with radioactive source are to stay in the Cell Build Room until final disposition
- Parts that are to be reworked must be cleaned and wipe tested before leaving Cell build Room

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- Each unit will be wipe tested upon receipt.
- Units that greater dpm# 12 will placed wiped clean using RADCON Solution and re-wiped. Units that are still not clean will be placed in glove box for further evaluation.
- Completed drift tube assemblies will be wiped prior to removed from cell bails and should be

• LESS THAN 10dpm/50cm²

- All gloves and wipes will be placed in radioactive waste containers
- Drift tube assemblies with contamination will be placed in a separate waste container for future disposal.
- Scintillation vials with readings greater than background will be placed in separate waste disposal container.





www.lancer-systems.com
 Voice: 215-256-9521
 Fax: 215-513-9411

PURCHASE ORDER

Purchase Order No.: 70051
 Date Issued: 2/15/07
 Buyer: Don Nester

2075 Detwiler Road
 Kulpsville, PA 19443
 USA

To:
 Apex Environmental Engineering & Compia
 6824 Hanging Moss
 Orlando,, FL 32087
 USA

Ship To:
 Lancer Systems LP
 2075 Detwiler Road
 Kulpsville, PA 19443
 USA

Good Thru	Ship Via	Account No.	Terms
3/17/07			Net 30 Days

Quantity	Item	Description	Unit Cost	Amount
80.00		80 Hours Radiation Protocol Training (Estimated to begin April 16, 2007)	120.00	9,600.00
320.00		320 Hours onsite RSO Services in support of Drift Tube Module Production (Estimated to begin August, 2007)	120.00	38,400.00
		Not to exceed PO total including expenses.		

Total	\$48,000.00
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Authorized Signature 

Lancer Systems LP Standard Procurement Terms & Conditions apply. Contact the buyer to request a copy and may be found on our website at www.lancer-systems.com