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MATERIAL TESTING LABORATORIES, INC.

A Subsidiary of Eastern Computers, Inc.

PHYSICAL AND NONDESTRUCTIVE TESTING • 1531 Early Street • Norfolk, Virginia 23502-1603

DECEMBER 2, 1994

Nuclear Materials Safety Section
U.S. Nuclear Regulatory Commission
Region II
101 Marietta Street, N.w. Suite 2400
Atlanta, Ga. 30323

Attn: Ms. Diane Heim

Subj: NRC License No. 45-17151-01 Requested
Changes In Industrial Radiography Program.

- 1. New Organization Structure - Section I
- 2. Emergency Phone Numbers - Section X
- 3. Operating and Emergency Procedures - Section XV
 - Section I PARA A.2.
 - Section II PARA A Add Note
 - Section III PARA A Sub PARA 2. Add Note
 - Section V PARA A & B
 - Section X Add Check List Procedure
- 4. Training XVI
 - Periodic Training
 - PARA C.4
 - PARA H.1 & H.2
 - Forth Day Last Sentence 1st Paragraph

Please advise if these changes will require an amendment to license.

Submitted By.



Peter H. Lorsche
Radiation Safety Officer,
Material Testing Laboratories, Inc.

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Point Of Contact:
Peter H. Lorsche
(804) 855-1971
Radiographic Safety Officer

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**MATERIAL TESTING LABORATORIES, INC.
1531 EARLY STREET
NORFOLK, VIRGINIA 23502**

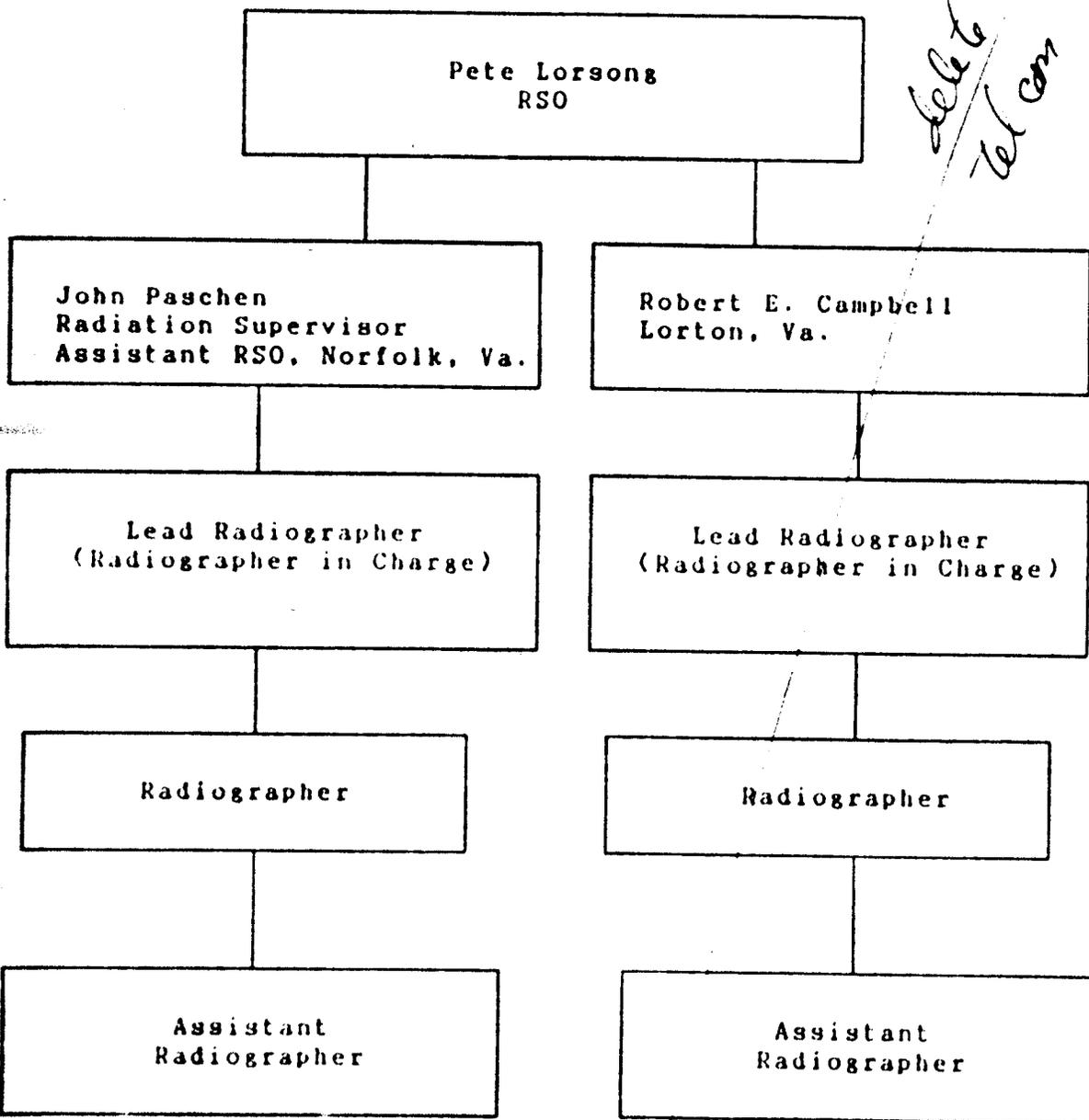
INDUSTRIAL RADIOGRAPHY PROGRAM

REVISED 12/2/94

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I. ORGANIZATIONAL STRUCTURE
RADIATION PROGRAM



*delete per
Tel com 5/16/95*

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X. EMERGENCY PHONE NUMBERS

TO BE POSTED IN CAB OF TRANSPORTING VEHICLE

OFFICE: Pete Lorsong, RSO
MATERIAL TESTING LABORATORIES, INC.
1531 Early St.
Norfolk, Virginia 23502
(804) 855-1971

John Paschen, ARSO, Supervisor
MATERIAL TESTING LABORATORIES, INC.
1531 Early St.
Norfolk, Virginia 23502
(804) 855-1971

HOME: Pete Lorsong
2728 Derry Drive
Chesapeake, VA 23323
(804) 485-1887

John Paschen
574 Allen's Mill Road
Yorktown, VA 23692
(804) 898-4016

EMERGENCY PROCEDURE

Radiographer or Radiographer Assistants shall never attempt to retrieve a source. Only the Radiation Safety Officer, Pete Lorsong or the Assistant Radiation Safety Officer, John Paschen are permitted to accomplish source retrieval.

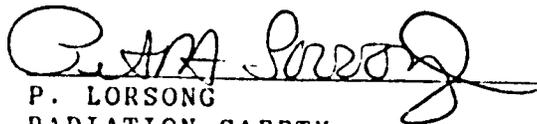
If they cannot be reached by telephone the Radiographer will call Amersham Corporation, Regulatory Branch in Burlington, Mass (617) 272-2000.

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XV. OPERATING AND EMERGENCY PROCEDURES GOVERNING THE USE OF RADIOACTIVE ISOTOPES AND X-RAYS FOR INDUSTRIAL RADIOGRAPHY.

THE OPERATING AND EMERGENCY PROCEDURES SHALL NOT BE CHANGED WITHOUT PRIOR APPROVAL OF THE LICENSE AND THE NUCLEAR REGULATORY COMMISSION.



P. LORSONG
RADIATION SAFETY
OFFICER

J. Paschen
ASSISTANT RADIATION SAFETY OFFICE

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XV OPERATING AND EMERGENCY PROCEDURES

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I. RESPONSIBILITY FOR ADMINISTRATION OF THE RADIATION PROTECTION PROGRAM

A. The following personnel, in the management, will personally supervise the use of radioactive isotopes and are management delegates for the responsibility of safe use and security of radioactive materials used for industrial radiography.

1. Pete Lorsonz, Radiation Safety Officer
2. John Paschen, Assistant Radiation Safety Officer

B. Specific Responsibilities

1. The management delegates are directly responsible to the Licensee, MATERIAL TESTING LABORATORIES, INC. (herein referred to as the company), for the overall radiation protection program.
2. One of the management delegates shall act in the capacity of the Radiological Safety Officer (herein referred to as the RSO).
3. The Radiographer is responsible to the RSO for the safe use and security for the radioactive material assigned to him.
4. Film badges will be furnished and processed by an established film badge service, Siemens Gammasonics, Inc., 2000 Nuclear Drive, Des Plaines, Illinois, 60018.
5. N.R.C. required records of the external radiation exposure of all personnel permitted to work on or around radioactive materials shall be maintained by the company's Destructive and Non-Destructive test section radiological control department. Such records shall be in the form of a permanent one-third quarter - 13 week calendar quarter cumulative, and running cumulative lifetime record of radiation exposure.

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II. RADIOGRAPHIC PRODUCTION PERSONNEL

Although ionizing radiation is potentially harmful to the health of an individual, it can be used with a minimum of danger when the proper precautions are exercised. Over-exposure to ionizing radiation represents a health hazard as does over-exposure to sunlight. Yet both forms of radiation are used daily on a controlled basis with a minimum of danger to the users. It has been estimated that an individual may receive 100 millirem per week (mrem) each week for a working lifetime without harmful effects. Distance is the best protection against the effects of ionizing radiation. Both radiographic and non-radiographic personnel shall remain as far away from radioactive material as practical. Radiographic personnel working directly with radioactive materials shall exercise every available means to minimize the hazards of radiation exposure.

- A. All radiographic trainees in the Nondestructive Test Section shall be provided with a copy of these operating and emergency procedures. Following a minimum on-the-site training period of four weeks (under the supervision of a qualified radiographer) during which time they shall be instructed regarding the contents of these operating and emergency procedures, radiographic trainees shall be tested by the Licensees at the address shown on Form NRC-313R. Upon attaining a satisfactory test score, Nondestructive Test Section personnel may be qualified as a Radiographer's Assistant. Personnel who fail to attain a satisfactory score may be considered once for a retest. Note: Trainees will have no responsibility and will not handle exposure devices or manipulate controls.

- B. Following a minimum of three months experience as a Radiographer's Assistant (520 hours), an individual will be eligible for testing, regarding the contents of Appendix A, 10CFR Parts 20, 30 and 34. Upon attaining a satisfactory test score, Nondestructive Test Section personnel may be qualified as Radiographers. An individual who fails to attain a satisfactory score on the initial test may be considered for retest without further training. An individual who fails the first retest may be considered for retest following an additional on-the-job training period of 6 months. An individual who fails the second

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retest may be considered for retest following an additional on-the-job training period of 13 months.

- C. The RSO shall impose periodic written and/or oral tests to determine the Radiographic Operator's knowledge and understanding of these operating and emergency procedures. The RSO shall make periodic audits of radiographic job sites to ascertain that radioactive sources are being used safely and according to regulations. The time between such visits shall not exceed 3 months and shall include all radiographers and assistants. Unsatisfactory reports shall be evaluated by the RSO and appropriate remedial action taken.
- D. Conditions noted by management audit which warrant immediate action shall be corrected. This includes removal of a radiographer or assistant whose work habits are questioned. Any immediate action taken shall be reported to the RSO (when applicable) and the responsible management delegate. Any individual removed from radiation work shall satisfy the requirements set forth in A and B of this section before they may be qualified.
- E. Each Radiographer shall have a copy of the following documents at the job site.
1. Appendix A, 10CFR, Parts 20, 30 and 34.
 2. MATERIAL TESTING LABORATORIES, INC. Operating and Emergency Procedures.
- F. Each Radiographer's Assistant shall be a copy of Operating and Emergency Procedures on the job site.

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III. INSTRUCTIONS FOR THE SAFE OPERATION OF RADIOGRAPHIC EXPOSURE DEVICES AND STORAGE CONTAINERS

A. General:

The Radiographer and Radiographer's Assistant are the only personnel permitted to use radioactive materials for radiography.

The responsibilities of the Radiographer are as follows:

1. Safe use and security of the radioactive material.
2. Actions of the Radiographer's Assistant and any trainees assigned to him for on-the-job training. Note: Trainees will have no responsibilities and will not handle exposure devices or manipulate the controls.
3. Actions of any other authorized personnel in the restricted area.
4. Monitoring of the restricted area.
5. Clearing and keeping clear of all personnel from the restricted area.
6. He shall remain in attendance during the entire time a source is exposed in a temporary radiographic area. While the source is not exposed, the Radiographer's Assistant shall be in attendance during any required absence by the Radiographer.
7. He shall survey the exposure device (or storage device in the case of open air sources) when removed from storage and when returned to storage to ascertain that the radioactive material is within the device and properly stored. The entire circumference of the radiographic exposure device shall be surveyed including the source guide tube. He shall record the survey data on the company's Radioactive Material Utilization Form which must be retained by the Nondestructive Test Section for examination by the Atomic Energy Commission (Nuclear Regulatory Commission) for a period of three (3) years.

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B. Mechanically Propelled Devices (i.e. Automation Industries Iriditrons, Multitrons, etc.):

The exposure device shall be placed in its operating location. The control cable shall then be connected to the source pigtail with particular attention to the fit. A loose fit shall be adjusted by qualified personnel or a replacement source obtained prior to proceeding with the work. The control cable shall then be positioned avoiding sharp bends in a manner which will place the Radiographic Material while exposing the source. The source tube shall now be positioned avoiding sharp bends. The survey meter shall then be checked as in V.B. The exposure device shall then be unlocked and the source run into position using a slow, steady motion, approaching the total run-out very slowly. The radiation area boundary shall then be monitored with a survey meter. Once the exposure is complete the radioactive material shall be retracted into the exposure device. The area shall then be monitored to ascertain that the radioactive material is safely stored within the device. The Radiographic Operator shall then immediately lock the exposure device and check the survey meter and source tube as described in V.B. and D.

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IV. INSTRUCTION FOR RESTRICTING RADIOGRAPHIC AREAS

A. Definitions

1. "Unrestricted Area" means any area access to which is not controlled for purposes of protection of individuals from exposure to radiation and radioactive materials.
2. "Restricted Area" means any area access to which is controlled for purposes of protection of individuals from exposure to radiation and radioactive materials.
 - a. Any area must be made a Restricted Area and have access controlled when the radiation level is such that, if an individual were continuously present in the area, he could receive a dose in excess of two millirems (2mrems) in one hour or 100 millirems (100 mrems) in any seven consecutive days.
3. "Radiation Area" means any area accessible to personnel, in which there exists radiation at levels such that an individual could receive a dose in excess of 5 millirems (5 mrems) in any one hour or 100 millirems (100 mrems) in any 5 consecutive days.
4. "High Radiation Area" means any area in which radiograph is performed, and while such radiography is being performed, it is considered identical to a Restricted Area.
5. "Radiographic Area" means any area in which radiography is performed, and while such radiography is being performed, it is considered identical to a Restricted Area.

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B. Restriction Requirements:

1. Access to the restricted area shall be controlled such that an unauthorized person could not receive a radiation dose in excess of 2.0 mr/hr. Access shall be controlled by constant policing, and the perimeter of the area shall be roped off with the rope approximately waist high in the way of all possible accesses into the area and signs shall be placed on the ropes at conspicuous locations with the information:

DANGER
RADIATION AREA
KEEP OUT

2. Area in which a person would receive a dose in excess of 100 millirems in any one hour will be posted at the calculated 100 mr/hr level at conspicuous locations with the information:

DANGER
HIGH RADIATION
AREA

Do not use radiation survey instrument to determine High Radiation Areas.

3. The Radiographer shall keep the area under constant surveillance, (assisted as necessary by the Radiographer Assistant during the entire exposure.) In the event the Radiographer must leave the area while the source is not exposed, the Assistant shall keep the exposure device housing the source under constant surveillance. The area shall not be violated by any unauthorized personnel. Authorization to enter a radiographic area must be obtained from the Radiographer in charge of that area. In the event that an unauthorized person enters the area, the Radiographer shall:
 - a. Secure the source and/or remove the individual from the area.
 - b. Obtain the violator's name and address (or department where applicable.)
 - c. Determine the radiation exposure dose received.
 - d. Report the violation to the RSO (through proper channels) for appropriate action.

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NOTE: The source must be secured and locked prior to and during the entry of unauthorized personnel into the radiographic area.

- C. Establishment of Areas: The Radiographer shall determine and establish the Restricted and Radiation areas prior to any exposure.

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V. INSTRUCTIONS FOR USE OF RADIATION SURVEY METERS

- A. At least two calibrated & operational survey meters with a range of 0-1 R/hr shall be available at the exposure site. In no case is an exposure to be made without a properly operating survey meter.
- B. If any survey meter in use appears to be malfunctioning the radiographer will immediately return the source to its shielded position and all radiographic operations will cease until a second calibrated and functional survey meter can be obtained.
- C. The survey meter shall be checked for proper operation immediately prior to exposing the source and after retracting the source. The entire circumference of the source exposure device shall be surveyed. If the meter does not give the correct reading for that device, the Operator shall consider the meter defective and report the meter as described in XI.
- D. Immediately after the source is in the exposure position the Radiographer shall monitor the restricted area and adjust as necessary the rope boundary to assure that the radiation level as read on the survey meter will not permit any unauthorized person to receive a radiation dose in excess of 2.0 mr/hr.
- E. Following the exposure and the return of the radioactive material to the exposure device, the radiographer shall completely monitor the area with special attention to the source tube and the front of the exposure device, to assure that the radioactive material has been safely returned to the exposure device and that it is safe to approach the set-up.
- F. Survey meters shall be calibrated by MATERIAL TESTING LABORATORIES, INC. or G. E. Smith & Associates, Pasadena, Texas 77506, at least once every three months, and whenever the meter is repaired. A sticker showing the date of calibration shall be attached to the meter. Repair of survey meters will be accomplished by G. E. Smith & Associates or a qualified repair facility. A record of the calibration shall be retained for inspection by the Nuclear Regulatory Commission.

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VI. INSTRUCTIONS FOR USE OF PERSONAL MONITORING EQUIPMENT

- A. All Radiographers and Radiographer Assistants working in a Restricted Area shall wear:
1. A film badge.
 2. A charged dosimeter
 3. A rate meter
- B. Special processing of film badges will be done as necessary and the results reported to the management delegates by telephone and written report. Any film badge reading in excess of 100 mrem/wk shall be investigated to determine the cause of the exposure and necessity for remedial action.
- C. Dosimeters will be supplied by the company and maintained by the company's Nondestructive Testing Section. Dosimeters will be calibrated, cleaned, and drift tested by the company's Radiological Control Section at least once every twelve months. Dosimeters shall be read and the readings recorded at the beginning and end of each work shift on the Daily Utilization Form.
- D. Rate meters shall be calibrated every twelve months and battery checked before each use.
- E. If an individual's dosimeter reads off scale:
1. The individual shall immediately remove himself from the radiation area and notify the Radiation Safety Officer.
 2. The dosimeter shall be looked at after each entry into a radiation area and shall be looked at often during the radiographic operation to determine if any abnormal dose of radiation has been received. Should the dosimeter be found to read off scale it will constitute an emergency situation and the Radiographer shall immediately comply with VI.C.1. (a) (b) & (c) of this procedure.
- E. THE RSO SHALL:
- (1) Send the individual's film badge to: Siemens Gammasonics, Inc., 2000 Nuclear Drive, Des Plaines, Illinois 60018, to be processed and request immediate results by wire or telephone.
 - (2) Ascertain that the individual does not work with or around radioactive material until cleared to do so by the dosimeter laboratory report.

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VII. INSTRUCTIONS FOR JOB SITE TRANSPORTATION OF SOURCES FROM THE STORAGE FACILITY TO THE EXPOSURE SITE

- A. Carts designated specifically for such service shall be used for transporting radioactive materials within a job site whenever possible.
- B. When it becomes necessary to move exposure devices by hand, they shall be kept as far from the body as possible and the length of time of such close handling shall be kept to a minimum.
- C. At the exposure site, the exposure device shall be left at least ten feet away from the set-up, if possible and practical, until everything is in readiness for the exposure.
- D. The Plant Protection and Safety Department (or equivalent, i.e., Plant Fire Department, Security Officer, etc.) shall be notified when the radioactive materials are removed from their designated storage and the area where the radioactive materials are to be used. The Plant Protection and Safety Department (or equivalent) shall be informed when the radioactive material has been returned to its designated storage area.

VIII. INSTRUCTION AND REGULATIONS FOR TRANSPORTING BY-PRODUCT MATERIAL TO AND FROM RADIOGRAPHIC AREAS

- A. The by-product material to be transported shall be only that material licensed for use by the company.
- B. The requirements of the company's operating and emergency procedures shall be applicable.
- C. All commercial shipments of by-products material shall be made in accordance with applicable NRC and DOT regulations.
- D. In preparation for shipment, the control cables and source tube shall be disconnected from the exposure device, the source locked in position, with plugs in the source tube and control cable connection.
- E. A tag bearing the standard radiation symbol and the following words shall be secured to the exposure device:

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DANGER
RADIOACTIVE MATERIAL
DO NOT HANDLE
NOTIFY CIVIL AUTHORITIES IF FOUND

The tag shall be a minimum of three (3) inches square painted with magenta or purple letters on a yellow background. The reverse side shall bear the company name, emergency phone numbers, and the words "Call Collect."

F. If necessary, civil authorities shall be notified for assistance in an emergency.

G. In the event of a shipment of by-product material by private transport, Steps A, B, D, E, and F of this section shall apply. The shipment shall conform to applicable NRC and DOT shipping requirements. In addition, the projector with by-product materials shall be under the surveillance of a Radiographer at all times during transportation. The Radiographer shall have a properly operating 0-1R/hr survey meter in the vehicle. Signs bearing the word "Radioactive" shall be attached on all four (4) sides of the vehicle. A survey shall be conducted to insure that the level of radiation does not exceed 10 mr/hr at 6 feet from the external surfaces of the vehicle. The requirements of Section VIII.G.4 shall apply in all cases. If shipment by private transport should involve storage of the by-product materials over-night, the following instructions shall apply:

1. The by-product material may be stored in the vehicle trunk or closed truck which is lockable. The projector shall be secured to the vehicle and padlocked.
2. The vehicle shall not be parked on a public street.
3. The sources shall be placed in a steel container and locked. The container shall be placed in the storage compartment provided in the mobile laboratory and locked. The door of the storage compartment shall be posted with a standard radiation caution symbol with the following words:

CAUTION
RADIOACTIVE MATERIAL
KEEP OUT

After making radiation survey of the storage compartment, the mobile laboratory (truck) shall be locked. After locking the mobile laboratory make a radiation survey of the vehicle to make sure that the

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radiation level does not exceed 2 mr/hr from any external surface of the vehicle. The laboratory (vehicle) shall be posted in accordance with Sec. X(h).

4. The vehicle, projector and padlock keys shall be in possession of the Radiographer at all times.
5. The radioactive material shall be stored and shielded so that no occupants of the vehicle shall be exposed to radiation in excess of 2 mr/hr.
6. Maximum security shall be maintained on all by-product material both in and out of storage.
7. The radiographer shall notify the responsible management delegate of his expected time of arrival at the job site prior to leaving the storage area. Upon arrival at the job site, he shall notify the responsible management delegate of his arrival. Upon leaving the job site, he shall notify the responsible management delegate of his departure time and expected time of arrival at the storage area. The Radiographer shall report any unexpected change in schedule to the responsible management delegate.
8. A vehicle transporting radioactive material which is overdue for one hour shall be immediately reported to the civil authorities.

IX. INSTRUCTIONS CONCERNING SECURITY OF SOURCES DURING STORAGE

- A. Radioactive material shall be stored only in those lockable areas designated for such use. Normally, this will be at MATERIAL TESTING LABORATORIES, INC., 1531 Early Street, Norfolk, VA 23502.
- B. Storage areas shall be posted with signs bearing the radiation caution symbol and the words:

DANGER
RADIOACTIVE MATERIAL STORAGE
KEEP OUT
- C. Storage areas shall be equipped with a lock on all doors and shall be locked except when in use by the management delegate or Radiographers.
- D. Storage areas shall be surveyed at least once per quarter. The results of the survey shall be recorded and such record retained for three (3) years.

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- E. Storage at temporary job sites will be in the company owned mobile laboratory or trunk of vehicle. When a vehicle containing radioactive sources is parked in public areas (eg. motel, parking lots) overnight, ensure that the vehicle is parked off public roads and as far from habituated structures that the radiation level (as read on a radiation survey instrument) from all surfaces of the vehicle will not exceed 2.0 mr/hr. The vehicle will be posted with signs reading "CAUTION RADIOACTIVE MATERIAL". All openings of the vehicle will be locked and keys will be in the Radiographer's possession.

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X. EMERGENCY PROCEDURE FOR RADIOACTIVE MATERIAL INCIDENTS

An incident is defined as any condition where a person is known to have been exposed, is suspected to have been exposed or will necessarily have to be exposed to radiation exceeding 100 mrem per week.

A. In the event of a radioactive material incident, the Radiographer shall:

1. Sufficiently clear personnel from the incident area and utilize any other available means to insure that no unnecessary exposure will occur.
2. Report the details of the incident by telephone to the RSO.

NOTE: On jobs where a Radiographic Safety Officer is present, the Radiographer will report the details of the incident to the Radiation Safety Officer. In the event that the incident was caused by an equipment malfunction, no one shall be permitted to tamper with the equipment unless authorized by RSO.

B. The RSO shall direct action to be taken.

NOTE: In the event that radioactive material must be removed from the site, such operations will be performed by the RSO or his designate.

1. The RSO or his designate shall attempt to determine if any personnel have received over-exposure, and shall take necessary action for medical processing of known and suspected over-exposures. Either of the management delegates or those persons designated by them shall evaluate the incident and determine the course of action. All radioactive material retrieval procedures shall have the prior approval of the RSO.
2. No persons other than those designated by the RSO shall enter the Restricted Area.
3. In the event of a ruptured source capsule, the Nuclear Regulatory Commission and the by-product material vendor shall be notified.

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4. No attempt shall be made to secure a source without the proper safety equipment, nor shall any person be permitted to exceed his maximum permissible dose.
 5. Following each radioactive material incident, a full report shall be submitted to the management delegates by the Radiographer.
- C. The Non-Destructive Test Section shall have available the following equipment:
1. 0-200 mr Dosimeters, 500 MR Rate Alarms
 2. 0-1r Dosimeters
 3. 0-10r Dosimeters
 4. (1) Survey Meter having a range of 1 to 1000 mr/hr
 5. Portable Local Shielding
 6. Special Handling Tools (tongs, etc.)
 7. Portable Storage Container
 8. (4) Flashlights
 9. Tool Box
 - a. Assorted Screw Drivers
 - b. Needle Nose Pliers
 - c. Vise Grips (medium)
 - d. Hammer (1 lb.)
 - e. Allen Wrenches (1 set)
 - f. Adjustable Wrenches (8" X 12")
 - g. Tube Cutter
 - h. Hack Saw

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CHECK LIST/PROCEDURE MALFUNCTIONING OR DAMAGED EXPOSURE DEVICE AND ASSOCIATED EQUIPMENT (RADIOGRAPHER)

1. Warn personnel. Assure all personnel are clear of radiation area. Inform customer of problem.
2. Survey and post areas as required to maintain the 2 MR/HR boundary.
3. No one shall be allowed to enter the area.
4. Try to ascertain the location of the sealed source in relation to the shielded position using the counter or dial on source crank handle assembly.

NOTE: If source cannot be retracted into shielded position but can be moved to the fully exposed position and a Collimator is being used, the fully exposed position will minimize the radiation exposure. Move the source with the crank assembly to the fully exposed position.

5. Maintain surveillance of the area until you can be relieved by a Radiographer or Assistant Radiographer. Emphasize to your relief the importance of keeping all persons out of the posted area.
6. Try to ascertain the complete problem and have the helper or assistant notify the RSO.
7. Do not proceed without specific instructions from the RSO.

(RSO)

1. The RSO or ARSO are the only persons authorized to retrieve the source.
2. When talking to the Radiographer, Assistant or Helper, ask specific questions:
 - Location of Source
 - Possible Cause
 - Dose Rate
 - Actions Taken at Scene at This Point
3. The RSO will ensure he brings the following equipment:
 - A. Rate Meter & Dosimeters
 - B. 0-1 , 0-10R , 0-200MR Dosimeters
 - C. Film Badge & Extra For Extremities.
 - D. Lead Shielding
 - E. Survey Meter
 - F. Tongs

- G. Flashlights
- H. Needle Nose Pliers
- I. Vise Grips
- J. Hammer
- K. Allen Wrenches
- L. Adjustable Wrenches (8" & 12")
- M. Tube Cutter
- N. Hack Saw
- O. Bolt Cutters
- P. Assorted Screw Drivers

5. Upon arriving at the scene the RSO shall check all posted boundaries.
6. Have face to face communication with Radiographer.
7. Try to ascertain cause.
8. Discuss with scene personnel best and quickest way to retrieve the source.
9. Plan a strategy to retrieve the source.
10. Figure possible dose rate to be received Prior to Retrieval.
11. In the event of a ruptured capsule notify Amersham or SPEC as appropriate for assistance.

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XI. DEFECTIVE EQUIPMENT

- A. Any equipment such as carrying cases, storage containers, handling tongs, cameras, survey meters, remote handling devices, etc., which are not in the designed working condition shall not be used. Immediately upon noting that the equipment is defective, the Radiographer shall:
1. Tag the equipment with a tag reading "Defective Equipment - DO NOT USE".
 2. Obtain a properly operating equipment replacement.
 3. If the defective equipment has resulted in an incident, take the steps prescribed in Section X.
- B. The radiographic equipment maintenance section of the Non-destructive Test Section shall investigate the defective equipment and make repairs as necessary.
- C. In the event repairs are of such nature as to cause the possibility of exposure to radiation, radiographic equipment maintenance personnel will not proceed with work until the RSO has been informed and have advised as to the proper action to be taken.
- D. Under no circumstances will any individual with MATERIAL TESTING LABORATORIES, INC. attempt to perform major repairs or make modification to any exposure device or its designed equipment.
- E. Faulty equipment will be labeled DO NOT USE and will be shipped to the manufacturer for repair or replacement by the RSO.

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XII. REMOVAL AND EXCHANGE OF SEALED SOURCES IN EXPOSURE DEVICES

Only qualified Radiographers, RSO, or Assistant RSO will change sources from the exposure device to the shipping container (source changer).

Only qualified Radiographers who have been thoroughly indoctrinated in the handling of the exposure devices, remote control equipment and the shipping container (source changer) will change sources and only after they have proven to the RSO or Assistant RSO that they understand the change operations. Before the Radiographer becomes qualified to perform the source exchange he will make the exchange in the presence of the RSO or assistant RSO.

Instructions for Transfer of Sealed Sources From Shipping Container to Exposure Device:

The Radiographer shall change the source as follows:

- a. Locate the source changer near the head of the exposure device.
- b. Position and lay out the control cable of the exposure device.
- c. Expose the end of the control cable approximately 3 to 4 inches by turning the control crank clockwise.
- d. Remove the safety plug on the control cable to the end of the exposure device.
- e. Connect the end of the control cable to the end of the pigtail of the source.
- f. Attach the control cable adapter to the exposure device.
- g. Remove the plug from the empty chamber of the source changer.
- h. Attach the short source tube supplied with the source change to the empty inlet of the empty chamber of the source changer.
- i. Remove the safety plug from the front of the exposure device and connect the free end of the short source tube in its place.
- j. Unlock the exposure device and crank the source into the empty chamber of the changer by turning the hand crank until it stops.
- k. Check the exposure device and source changer with a radiation survey meter to ensure that the source is into the source changer.
- l. Detach the source tube from the source changer and disconnect the source pigtail from the control cable.

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- m. Replace the safety plug in the source changer.
- n. Remove the safety plug from the loaded chamber.
- o. Connect the source pigtail to the control cable. Exercise care in this operation and do not pull the pigtail out of the source changer any farther than is required to make the connection.
- p. Attach the short source tube to the source exchanger.
- q. Withdraw the source changer into its safe position in the exposure device, by turning the hand crank counter clockwise until it stops, and the source indicator is at "0" position.
- r. Check the exposure device and source tube with a radiation survey meter to ensure that the source is in its safe position within the exposure device.
- s. Lock the exposure device.
- t. Remove the source tube from the exposure device and source changer and replace the safety plugs.
- u. Remove the control cable from the exposure device.
- v. Disconnect the source from the control cable and insert the safety plug.
- w. Reseal outlets on source changer with lead seals provided.
- x. Remove the old identification tag from the exposure device and place it in the source exchanger.
- y. Remove the new identification tag from the source exchanger and place it in the I.D. slot of the exposure device.
- z. Only Radiographers experienced in the transfer of sealed sources to and from shipping containers shall be utilized in the transfer.

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XIII. RECORDS TO BE MAINTAINED

- A. The following records are to be initiated by the Radiographer and submitted for review and maintenance to the responsible management delegate or their designate:
1. Radioactive Material Daily Utilization Form
 2. In and Out of Storage Surveys
 3. Dosimeter Readings
 4. Equipment Daily Inspection Reports
- B. The following records are to be initiated by the NDT Department maintenance personnel and submitted for review and maintenance to the responsible management delegate or their designate:
1. Equipment Repairs Required and Completed
 2. Instrument Calibration
- C. The following records are to be initiated by the management delegates and maintained by them or their designate.
1. Internal Inspections
 2. Incident Reports
 3. Shipping and Receiving of Radioactive Material
 4. Quarterly Source Inventory
 5. Film Badge Reports and Radiation History
 6. Leak Test Results
 7. Survey of Radioactive Material Storage Area and Sketch

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XVI - TRAINING

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1531 EARLY STREET

NORFOLK, VIRGINIA 23502

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TRAINING

Supplementary training will be administered on the following conditions:

- a. Regular - at least once annually
- b. Special - when new regulations or equipment are changed
- c. A one hour safety meeting will be conducted at least once every month, and radiographers and assistants may discuss special assignments they have performed.

Qualifications of individuals who will provide the training and will examine individuals:

Pete Lorson - Radiation Safety Officer

John Pachen - Assistant Radiation Safety Officer

SUPPLEMENT NO. 2

ON-JOB TRAINING

TRAINEES:

Trainees will have no responsibilities and will not handle exposure devices or manipulate the controls.

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TRAINING AND EXPERIENCE IN RADIATION SAFETY AND USES OF
SEALED SOURCES AND DEVICES

Training Program for Radiographic Personnel

1. Radiation units of dose and activity
2. Effects of radiation
3. Controlling radiation exposure
4. Radiation equipment and survey meters
5. Personnel monitoring equipment
6. Establishing and controlling the restricted area
7. Emergency procedures and notifications
8. Shipping and transporting radioactive materials
9. Applicable regulations and responsibilities
10. Reports and records
11. Instructions for radiographic equipment
 - a. Remote handling equipment
 - b. Radiographic exposure devices
 - c. Storage containers
 - d. Requirements of pertinent NRC regulations.

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RECOMMENDED TRAINING AND EXPERIENCE MINIMUM LEVELS

HOURS OF TRAINING RELATIVE TO EDUCATION LEVEL

Completion with a passing grade of at least 2 years of engineering or science study at a university, college, or technical school.

High school diploma, graduation, or equivalent.

Grammar school education, or demonstrated proficiency, or additional training

LEVEL I	RT LEVEL II
12	40
20	40
80	100
3	9

WORK TIME EXPERIENCE IN MONTHS

All educational levels

For Level II certification, the experience shall consist of time at Level I. For qualification directly to Level II, the required experience shall consist of the total time required for Level I and Level II as a trainee and the hours of training required for Level I and Level II in total shall be applicable.

Appropriate credit can be given for training or experience in more than one method simultaneously, if at least 25% of the work time is spent on each test method.

Level I - Radiographer

Level II - Radiographer/Interpreter

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SECTION XVI - TRAINING PROGRAM FOR RADIOGRAPHIC PERSONNEL

A. INDIVIDUAL REQUIREMENTS:

1. High School Diploma or equivalent (Age and experience will sometimes satisfy this requirement).
2. Good physical condition.
3. Ability to perform basic mathematical formulas involved in industrial radiography.
4. Successful completion of the Radiological Safety Course.

B. OBJECTIVES OF TRAINING PROGRAM: The primary aim of the Radiological Safety Course is to provide program which develop radiographic personnel to a degree of efficiency.

1. Knowledge of U.S. Nuclear Regulatory Commission regulation Procedures.
2. Company Administrative Control and Radiological Protection Procedures.
3. Use of radiographic devices and equipment.
4. Safe handling of radioactive material and,
5. A general working application of this knowledge in actual operations.

C. TRAINING PROGRAM - GENERAL

1. Equipment and Material Assignment: At the onset of program, each individual will be assigned the following:
 - a. U.S. Nuclear Regulatory Commission CFR Title 10, Parts 19, 20 and 34.
 - b. Company "Administrative Control and Radiological Protection Procedures".
 - c. Copy of the Company Byproduct Material Use License with amendments.
2. Equipment Assignment: On the fourth day of training it is probable that the instructor will know whether or not the trainees will be able to complete the course successfully and then the following equipment will be issued.
 - a. Film Badge
 - b. Pocket Dosimeter
3. Designation of Responsibilities: The Radiological Safety Course will be basically the same for RADIOGRAPHERS AND ASSISTANT RADIOGRAPHERS, with the following exceptions:

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- a. RADIOGRAPHERS will be thoroughly familiarized with their individual responsibilities relative to the safe handling and use of radioactive materials. A composite grade of 85% will be required on the RADIOGRAPHIC examination for assignment. This examination will be especially geared for RADIOGRAPHERS and not ASSISTANTS.
 - b. ASSISTANT RADIOGRAPHERS will be thoroughly instructed as to their responsibilities as well as the limitations of their position. A composite grade of 80% will be required for assignment. The examination will be especially prepared for ASSISTANT RADIOGRAPHERS.
4. Practical Experience (on-the-job-training): Before definite assignment to any position is made, the individual must first work under the direct control of a qualified and experienced RADIOGRAPHER until the individual is certified by the RADIOGRAPHIC SAFETY OFFICER to conduct actual operations or assist in same safely and efficiently.

D. REFERENCE MATERIAL

1. United States Nuclear Regulatory Commission, Code of Federal Regulations, Title 10, Parts 10, 20, 34, 71.
2. Department of Transportation, Code of Federal Regulations, Title 49, Parts 170-178.
3. MTL, INC., "Administrative Control and Radiological Protection Procedures."
4. U.S.N.R.C. Byproduct Material Use License.
5. Industrial Radiography Manual OE - 80436.
6. Industrial Radiography Instructor's Guide OE - 84034.
7. General Dynamics, Convair Division.

- a. Programmed Instruction Handbook, NONDESTRUCTIVE TESTING, Radiographic Testing P1-4-6.

- (1) Volume I - Origin and Nature of Radiation
- (2) Volume II - Radiation Safety
- (3) Volume III - Radiographic Testing

- b. Film Strips: NDT - Radiographic Testing

8. Individual manufacturer specifications.

E. EXAMINATIONS

1. Formal Examination: A formal examination generally

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covering radiography shall be administered for each position. Time limit for the examination shall be a maximum of 180 minutes and no reference material will be allowed. Sufficient paper and pencils will be provided. Formal examinations will consist of the following:

- a. Radiographer Examination: This test will consist of at least 40 questions of varying point value covering the following subjects:
 - (1) Radiation Units of Dose and Activity
 - (2) Effects of Radiation
 - (3) Controlling radiation exposure
 - (4) Radiation equipment and survey meters
 - (5) Personnel monitoring equipment
 - (6) Establishing and controlling the restricted area
 - (7) Emergency procedures and notification
 - (8) Shipping and transporting radioactive materials
 - (9) Applicable regulations and responsibilities
 - (10) Reports and records
 - b. Assistant Radiographers: The test shall consist of at least 30 questions of varying point value covering the same basis subjects contained in the Radiographic examination. Special emphasis will be made on the particular duties and limitations of the position.
2. Oral Examination: An oral examination shall be administered to each individual. This examination shall stress the need for making quick decisions using basic math and reasoning without benefit of references or manual figuring with calculators or pencil and paper. The quiz shall consist of at least 10 questions and the grade will be determined by the examiner.
 3. Practical Examination: A brief practical demonstration of the individual's techniques in handling material shall be conducted and observed by the examiner. A basic checklist will be used to cover all major areas of performances.

F. GRADING OF EXAMINATIONS

1. Composite Grade: An average of all three (3) areas of examination (Formal, Oral and Practical) shall determine the final grade. A passing grade in all segments will be required as follows:

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a. Formal Examination

- (1) Radiographers - 85% or better
- (2) Assistant Radiographers - 80% or better

b. Oral Examination

- (1) Radiographers - 75% or better
- (2) Assistant Radiographers - 70% or better

c. Practical Examination

- (1) Radiographers - 80% or better
 - (2) Assistant Radiographers - 75% or better
- Grades shall then be averaged using percentile weights for each examination as follows:

Percentile Weights: Levels of importance will be assigned to each examination.

Example: Formal - 0.5 percentile weight
Oral - 0.2 percentile weight
Practical - 0.3 percentile weight

These percentile weights (PW) are multiplied by the actual grade percentage (AP) and then added to achieve the final grade.

G. Final Grade Requirements

- (1) Radiographers: A final grade of 85% will be required for assignment. Grades of 70% to 84% will call for additional training and retesting. Grades under 70% will disqualify the individual from further activity as radiographic trainee.
- (2) Assistant Radiographers: A final grade of 80% will be required for assignment. Grading 65% to 79% will call for additional training and subsequent retesting. Grades under 65% will disqualify the individual from further activity as radiographic trainee.

H. PERSONNEL WITH PREVIOUS TRAINING AND EXPERIENCE IN RADIOGRAPHY

1. There will certainly be instances when previously trained and experienced personnel will be applying for radiographic positions. The training program will not be adjusted.

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2. Training will be as outlined in the training schedule Table I.

H. TRAINING SCHEDULE: See Table I.

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H. TRAINING SCHEDULE

TABLE I. TRAINING PROGRAM - RADIOGRAPHER ASSISTANT

The training schedule outlined below will be for Radiographer and Radiographer Assistant for the first three days. Specific training relative to the position will be given on the fourth and fifth days.

CLASSROOM TRAINING COURSE

FIRST DAY

I. FUNDAMENTALS OF RADIATION SAFETY

- A. Characteristics of Gamma Radiation 15 min.
- B. Units of Radiation Activity and Dose 15 min.
- C. Biological Effects of Radiation 15 min.
- D. Hazards of Excessive Radiation 15 min.
- E. Radiation Levels from Licensed Radioisotopes 15 min.
- F. Controlling Radiation Dose
 - 1. Time 15 min.
 - 2. Distance 15 min.
 - 3. Shielding 15 min.
- G. Review of Lecture Material 15 min.

II. RADIATION DETECTION INSTRUMENTS

- A. Radiation Detection Instruments and how to use them 15 min.
- B. Use of Radiation Detection Instruments
 - 1. Operation 15 min.
 - 2. Calibration 15 min.
 - 3. Interpretation 15 min.
- C. Direct Techniques
 - 1. Personnel Monitoring 15 min.
 - 2. Film Badges 15 min.
 - 3. Dosimeters 15 min.
- D. Review of Lecture Material 15 min.

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SECOND DAY

- I. RADIOGRAPHIC EQUIPMENT MAINTENANCE
 - A. Exposure Device Maintenance
 - 1. Equipment Characteristics 15 min.
 - 2. Principles of Operation 15 min.
 - 3. Capabilities and Limitations 15 min.
 - B. Exposure Device Maintenance
 - 1. Equipment Characteristics 15 min.
 - 2. Principles of Operation 15 min.
 - 3. Capabilities and Limitations 15 min.
 - C. Storage of Radiographic Material 15 min.
 - D. Leak Test 15 min.
 - E. Transportation of Radiographic Material 15 min.
 - F. Review (Question & Answer Period) 25 min.
- II. USE OF RADIOGRAPHIC EQUIPMENT
 - A. Preparation 15 min.
 - B. Field Use 15 min.
 - C. Use of Radiographic Material 15 min.
 - D. Development 15 min.
 - E. Review (Question & Answer Period) 25 min.
- III. GENERAL REVIEW 15 min.
- IV. LUNCH 15 min.
- V. COMPANY MEMORANDUM 15 min.
- VI. REVIEW 15 min.
- VII. INDIVIDUAL REPORT PREPARATION 15 min.
- VIII. MEETING 15 min.

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FOURTH DAY

All training from this point on will concentrate on the particular responsibilities of the position the individual(s) is being trained for. Radiographers will receive instructions concerning their duties and responsibilities. Assistant Radiographers will receive instructions concerning their duties with special emphasis placed on the limitations of these duties and instructions for trainees.

- I. CONTROLLING ACCESS TO RADIATION AREAS
 - A. Establishing the Restricted Area 150 min.
 - B. Posting the Restricted Area
 - 1. Signs 10 min.
 - 2. Visual surveillance 10 min.
 - C. Movement of the Restricted Area 10 min.
 - D. All other aspects of the Radiation or Restricted Area 10 min.
 - E. Review questions & Answer Period 10 min.
- II. TRANSPORTING RADIOACTIVE MATERIAL 10 min.
- III. RADIATION IN THE EVENT OF EMERGENCIES
 - A. General instructions regarding Special Areas 10 min.
 - B. Emergency procedures 10 min.
 - C. Decontamination 10 min.
- IV. RADIATION MONITORING 10 min.
- V. RADIOACTIVE WASTE 10 min.
- VI. RADIOACTIVE MATERIALS 10 min.

FIFTH DAY

- I. INTRODUCTION TO RADIOACTIVE MATERIALS 10 min.
- II. GENERAL SAFETY 10 min.
- III. RADIATION SAFETY 10 min.
- IV. RADIOACTIVE MATERIALS 10 min.
- V. RADIOACTIVE WASTE 10 min.
- VI. RADIOACTIVE MATERIALS 10 min.

* This exercise is a practical method of determining the accuracy of the calibration of dose rate instruments. The dose rate will be determined by reference to personal and paper.

** This exercise may be done with a small group of individuals, dependent upon the equipment available.

*** The material presented will be demonstrated by individuals with the benefit of reference materials. Individual copies of the material presented will be available for reference.

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PRACTICAL EXAMINATION

(Radiographer)

Name: _____
S/S No. _____
Date: _____

The practical examination shall be conducted so as to provide the examiner with a general idea as to the proficiency of the applicant in the handling and use of exposure devices and related equipment. The extent of the demonstration can be determined according to the amount of experience and training that the individual has to his credit.

1. Select a particular item or situation for the individual, so that his ability to set up and conduct operations under a given condition is tested.
2. The following procedures will be observed:
 - a. Remove exposure device from storage. Make survey and visual inspection. Yes No
 - b. Positioning of exposure device
 - c. Arrangement of components
 - d. Visual inspection of components
 - e. Survey procedure:
 - (1) Setup of radiation areas. Calculated distance
 - (2) Posting of signs
 - (3) Checking boundaries with survey meter
 - (4) Number of times dosimeter was checked during the procedure
 - (5) Pre, during, and post-exposure survey technique
 - (6) Make sketch and fill out dilly use form
 - f. Inventory of equipment Survey Storage

The radiographer would be expected to do all of the above satisfactorily in order to be classified as a radiographer.

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PRACTICAL EXAMINATION

(Radiographer Assistant)

NAME: _____

S/S No. _____

Date: _____

The assistant radiographer will assist the radiographer in the practical examination.

The assistant under the direction of the radiographer will do the following:

1. Make radiation survey of the storage area.
2. Remove exposure device from storage and make radiation survey.

The assistant will perform the following with a dummy automation Model 429 exposure device (only a shell and S tube) with a dummy source and pigtail to provide and pigtail no real active isotope.

- a. Connect the dummy automation tube to the exposure device.
- b. Connect the remote control unit to the dummy source pigtail (test hook up with a slight pull to make sure the hook up is properly connected).
- c. Run the source out and back in.
- d. If necessary, replace all plugs and caps.
- e. Make radiation survey of the real exposure device and store.
- f. Change film markers.
- g. Check and correct by pigtail if alarm of the exposure device to make sure it is operating.
- h. Make out shipping form.

Before a radiographer assistant may leave the room he has to perform his duties with the remote control unit satisfactorily perform all the above to make sure he will be able to operate in case of an emergency until the radiographer is available to take over.

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PHYSICAL AND NONDESTRUCTIVE TESTING • 1531 Early Street, Norfolk, Virginia 23502-1603

Nuclear Materials Safety Section
U. S. Nuclear Regulatory Commission
Region II
101 Marietta Street., N.W. Suite 2900
Atlanta, GA 30323

*delete per
tel com 5/16/95*

Attn: Ms. Diane Heim

Subj: NRC License No. 45-17151-01 License Renewal Request with the following changes:

1. Change 7 to read:

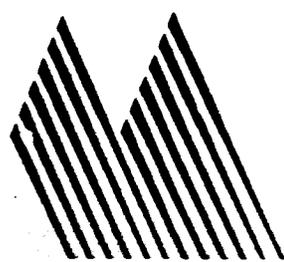
- 7. Chemical and/or physical form
 - A. Sealed sources (Amersham/Technical Operations Models 89913, A-424-9, A-424-20; Source Productions and Equipment Co., Inc. Models P-16, B-16F, T-7, T-5 and T-5-F.)
 - B. Sealed Sources (Amersham/Technical Operations Models 34500, A-424-14, A-424-15; Gamma Industries Models B-2-C, B-2-G or S-16)

2. Change 8 to read:

- 8. Maximum amount that license may possess at any one time under this license
 - A. No single source to exceed 200 curies (see condition 11)
 - B. No single source to exceed 100 curies (see condition 11)

3. Change 9 to read:

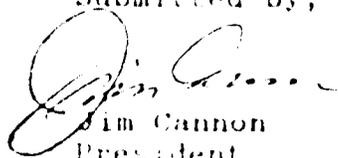
- 9. AUTHORIZED USE
 - A. For use in a compatible Gamma Radiography exposure device registered pursuant to 10 CFR 32.210 (Automation Industries Model 520; Amersham/Technical Operations Model 650 and 684) for performing industrial radiography and in a compatible source changer registered pursuant to 10 CFR 32.210 (Amersham/Technical Operations Models C-10, U-110, 650, and 750; Source Productions Equipment Co., Inc. C-1) for source storage and/or exchange.



B. For use in a compatible Gamma Radiography Exposure device registered pursuant to 10 CFR 32.210 (Automation Industries Model 51B or Amersham/Technical Operations Models 680 or 684) For performing industrial radiography and in a compatible source changer registered pursuant to 10-CFR 32.210 (Automation Industries Model I-563, Gamma Industries Model C-8 or Amersham/Technical Operations Models 771, 416 or 448) for source storage and/or exchange.

4. Copy of Operating and Emergency Procedures submitted with revisions.

Submitted by,



Jim Cannon
President

POINT OF CONTACT
Peter H. Larson, RSD
MATERIAL TESTING LABORATORIES, INC.
(804) 255-1371

*11/15/75
10/15/75*