



# Western Stress, Inc.

TECHNICAL SERVICES & ENGINEERING  
4221 DIRECTORS ROW • HOUSTON, TEXAS 77092 • (713) 681-7970

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Date	4/15/85
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By	Brown
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April 4, 1985



Mr. Charles Cain, Licensing Specialist  
Materials Licensing Section, Region IV,  
United States Nuclear Regulatory Commission  
611 Ryan Plaza Drive, Suite 1000  
Arlington, Texas 76011

Dear Mr. Cain,

## Amendment of Materials License Number 49-23490-01

We wish to make the following amendment to our materials license:

1. Addition of Technical Operations, Inc. sealed sources, exposure devices and source changers listed as Items 6, 7, 8 and 9 on the attached page.
2. Due to their resignation from the Company, remove the names of Pete Hanges as Superintendent-Radiation Protection Officer and Ruth Hanges as Assistant Superintendent-Radiographer.
3. Add the following names as Assistant Radiation Protection Officers (ARPO) and/or Radiographers:

Rick Johnson - ARPO  
Daniel K. Schleyer - ARPO, Radiographer

Resumes of these men are attached.

4. Added "Inspection Instructions for Tech/Ops Exposure Devices" - Items 3.2 and 3.3, page OS-3.
5. Reworded Item 9.0, page OS-5.
6. Changed from personal name to Title - Item 2.2, page GP-4.
7. Added R.S. Landauer Jr. & Co. as supplier of Film Badge Services - Item 5.0, pages GP-6 and GP-7 and Item 3.1, page AA-15.
8. Added "Operating Instructions for Tech/Ops Exposure Devices" - Item 2.4, page AA13.1.

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REG4 LIC30  
49-23490-01 PDR

Applicant	5152
Check No.	120/30
Amount/Fee Category	Amendment
Type of Fee	5/7/85
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Applicant	4895
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460589

Western Stress

Mr. Charles Cain  
Licensing Specialist  
U.S. Nuclear Regulatory Commission

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April 4, 1985

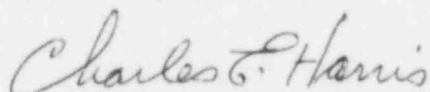
9. Added list of Agencies approved for Dosimeter and Survey Meter Calibration Services - Item 3.3 and Item 5, page AA-15.
10. Added "Tech/Ops Model 518 Leak Test Kit - Item 1, page AD-1.
11. Rewrote "Source Changing Instructions" - Item 2, pages AD-1 and AD-2.
12. Rewrote "Instructions for Returning Sources to Supplier" - Item 3, pages AD-3, AD-4 and AD-5.
13. Added instructions for Tech/Ops Model 518 Leak Test Kit - Item 4, pages AD-6 and AD-7.
14. Changed from personal names to Titles - Item B, pages RSTP-1 and RSTP-2.
15. Deleted all reference to Level I, Level II and Level III throughout manual. Titles are now strictly Radiographer and/or Assistant Radiographer.

Attached are copies of all the revised pages of the manual, descriptive brochures for the Tech/Ops equipment and NBS Certificate of Accreditation for the R.S. Landauer Jr. & Co.

Enclosed is a check in the amount of \$110.00 for the amendment fee.

Thank you for your prompt attention to this matter.

Yours very truly,



Charles E. Harris  
Corporate RSO  
Western Stress, Inc.

CEH:jc

Encl.

SEALED SOURCES, EXPOSURE DEVICES AND SOURCE CHANGERS

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
D. Iridium 192	D. Technical Operations Model A-424-9 sealed sources.	D. No single source to exceed 100 curies.
E. Iridium 192	E. Technical Operations Model 90003 sealed sources.	E. No single source to exceed 100 curies.
F. Iridium 192	F. Technical Operations Model 90003 sealed sources.	F. No single source to exceed 200 curies.
G. Iridium 192	G. Technical Operations Model A-58101-8 sealed sources.	G. No single source to exceed 200 curies.
H. Cobalt 60	H. Technical Operations Model A-424-14 sealed sources.	H. No single source to exceed 100 curies.
I. Iridium 192	I. Technical Operations Model 848.	I. No Single Source to exceed 100 curies.

9. Authorized Use

- D. For use in Technical Operations Model 660 exposure devices for industrial radiography and in Technical Operations Model 650 source changers for storage and source replacement.
- E. For use in Technical Operations Model 900 exposure devices for industrial radiography and in Technical Operations Model 850 source changers for storage and source replacement.
- F. For use in Technical Operations Model 920 exposure devices for industrial radiography and in Technical Operations Model 850 source changers for storage and source replacement.
- G. For use in Technical Operations Model 616 exposure devices for industrial radiography.
- H. For use in Technical Operations Model 680 exposure devices for industrial radiography and in Technical Operations Model 771 or Model 488 source changers for storage and source replacement.
- I. For use in Gamma Industries Model Century SA and Gulf Nuclear Models 20V and 40V exposure devices or Technical Operations Model 650 source changers for storage and source replacement.

Resume of Rick E. Johnson

Assistant Radiation Protection Officer

Formal Education

Utah State University (Logan, Utah)  
Industrial Technology - Welding  
Bachelor of Science 1977

Radiographic School

CBI Isotope Safety Class #45 - May, 1980

Professional Affiliations

American Welding Society, 1st Vice Chairman 1981,  
Salt Lake City Chapter  
American Society of Nondestructive Testing  
International Brotherhood of Boilermakers - Journeyman Welder

Certification

American Welding Society - AWS QC1 Inspector

Experience

Eight (8) years experience as Welding & Quality Assurance  
Engineer including:

Three (3) years on field construction projects as a Welding  
and Quality Assurance Engineer Trainee performing radiography  
(isotope and x-ray), monitoring radiation safety, grading  
film, etc.

Six (6) months in District Construction Office as Welding &  
Quality Assurance Engineer responsible for writing procedures  
and coordinating and supervising welding and nondestructive  
testing operations at field construction sites.

Four (4) years in fabrication shop as Welding & Quality  
Assurance Engineer and Foreman of Nondestructive Testing  
Department. Responsible for wiring procedures, training and  
supervising technicians, radiation safety (x-ray & isotope)  
and overall department operations.

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Resume of Daniel K. Schleyer

Assistant Radiation Protection Officer

Formal Education

Tennessee Technical University - 1½ years

Radiographic School

NDE Training & Technology - Union Carbide

Oak Ridge, Tenn. - 1978

6 month NDE Course - included 40 Hrs. Radiation Safety  
320 Hrs. Radiography

Industrial Heat Treating & Engineering Co. Radiation  
Safety Class - 1978

Trinity Engineering & Testing Radiation Safety Class - 1979

Hartford Inspection Radiation Safety Class - 1980

Technical Welding Radiation Safety Class - 1981

Metils, Inc. Radiation Safety Class - 1982

Experience

Seven (7) years experience in the field of nondestructive testing, performing radiography, monitoring radiation safety, grading film, supervising and training radiography personnel, etc.

EMERGENCY TELEPHONE NUMBERS

Michael Gress      307/789-8888 (Rings In Home)

Rick Johnson      307/789-8888 (Office)  
801/566-8487 (Home)

Daniel Schleyer    307/789-8888 (Office)  
307/789-2494 (Home)

Charles Harris      713/681-7970 (Office)  
713/376-2069 (Home)

## MANAGEMENT CONTROL

The management of the Evanston, Wyoming Office of Western Stress, Inc., consists of:

1. The Area Superintendent
2. The Assistant Area Superintendent
3. Field Supervisors
4. Radiographers
5. Assistant Radiographers

The Radiation Protection Officer or Assistant Radiation Protection Officer will perform the final review of all records and receipts involved with the handling and use of sealed sources by Western Stress, Inc. They will oversee the radiographic operations for Western Stress, Inc.

Michael Gress	Radiation Protection Officer (RPO)
Rick Johnson	Assistant Radiation Protection Office (ARPO)
Daniel Schleyer	Assistant Radiation Protection Officer (ARPO)
Larry Sanders	Radiographer
Curt L. Cowell	Radiographer
Kim L. Furgeson	Radiographer
Michael Davis	Assistant Radiographer
Mark Holloman	Assistant Radiographer

The RPO or ARPO will review the Daily Records kept by the radiographers. They will make certain that the radiographers and their assistants are complying with the NRC Regulations and the Operating and Emergency Procedures of Western Stress, Inc. Management will make an unannounced visit at least once every 90 days at radiographic sites. Where radiography is being done out of town for periods of three months or more, an inspection visit will be made by the Management during the first two weeks. During this inspection, Management will see that the radiographers and their assistants at these job sites are operating the equipment correctly, setting up proper restricted areas, using waring signs, ropes, etc. and using safe radiographic practices.

The RPO or ARPO will review all records, including work sheets, surveys, calibration charts and source changing. These reports and inspections will be checked for completion and accuracy regularly by the Management to ensure all regulations have been complied with. The RPO will set up the leak test and perform the quarterly inventories. He will perform an audit of the records at least twice a year, to be sure all records are complete and procedures are being followed.



## ORGANIZATIONAL STRUCTURE

Corporate Radiation Safety Officer (RSO)	Charles E. Harris
Radiation Protection Officer (RPO)	Mike Gress
Assistant Radiation Protection Officer (ARPO)	Rick Johnson
Assistant Radiation Protection Officer (ARPO)	Daniel Schleyer

Duties of the RPO and ARPO shall include the following:

### 1.0 MAINTAIN A PERSONNEL MONITORING PROGRAM

- 1.0.1. Handle emergency situations. When a individual's dosimeter goes off scale, the Radiation Protection Officer shall send that individual's TLD or film badge in for immediate processing. He will then recharge the dosimeter and leave it in an area which is free of any type of radiation for a period of approximately one hour. After this time lapse, recheck the dosimeter. If it is again discharged totally or partially, in all probability, the individual has not been exposed to an overdose of radiation. This would indicate that the dosimeter is probably faulty. The RPO will then determine if the individual may return to the radiation area with a new film badge and dosimeter.
- 1.1 Maintain control of procurement and disposal of licensed sources.
- 1.2 Maintain adequate storage facilities.
- 1.3 Instruct the training program.
- 1.4 Serve as the Licensee's liaison officer with the Nuclear Regulatory Commission.
- 1.5 Examine and determine competence of radiographic personnel.
- 1.6 Develop and maintain up-to-date operating and emergency procedures.
- 1.7 Conduct quarterly inventories and check utilization logs.
- 1.8 Establish and maintain the internal inspection system.
- 1.9 Maintain adequate radiation survey instruments.
- 1.10 Maintain survey instrument calibration program.
- 1.11 Maintain exposure devices, radiography facilities and associated equipment.
- 1.12 Oversee source replacement and source tagging operations.



## Organizational Structure Cont'd:

- 1.13 Review all film badge reports received for any high or unusual results. The individual involved will be informed of any high or unusual results.
- 1.14 Maintain a complete file on all film badge results received. The yearly results will be maintained on Form NRC-4 for each person assigned a film badge.
- 1.15 Assure that terminated employee receives his radiation record and that the proper reports are sent to the NRC in Washington per 10 CFR Part 20.40 and 20.408.
- 1.16 Perform leak tests.
- 1.17 Leak test reports will be filed in the leak test result file.

### 2.0 INSPECTION AND MAINTENANCE PROGRAM

- 2.1 The periodic inspection form and the quarterly inventory report forms will be filled out during this inspection and maintenance (OS 7, OS 8). These forms will be kept for a period of two years.
- 2.2 Arrangements will be made for the repair or replacement of all worn parts or broken parts immediately after this inspection.

### 3.0 INSPECTION ROUTINE - GAMMA CAMERAS

#### 3.1 Gamma Century, Gulf Nuclear 20V, Cobalt 60 Camera, and Gulf Nuclear 40V

- .1 Inspect for proper radiation warning signs affixed. Carrying handles will be inspected for torn areas. Two wheel source camera transporting dollies will be inspected for free and easy movement. Axle bearings should be oiled and source camera mounting bolts tightened.
- .2 If the camera has a source contained within it, transfer source into the C-10 or U-110A source changer. With the source removed, attach a rag to the end of the drive cable. Spray acetone on the rag and pull the rag through the camera "S" tube. If necessary, repeat pulling the rag through until the tube is clean.
- .3 Inspect the locking mechanism by operating with the key. Oil lock mechanism. With locking mechanism locked, pull the source cable and push the source cable to assure that the lock is holding the source in place.

Organizational structure cont"d:

- .4 With the Cameras unlocked, pull the source cable to see if the safety mechanism keeps the source from pulling out of the locking end of the camera. CAUTION! BE SURE THAT YOU DO NOT PULL THE SOURCE OUT OF THE CAMERA. Use a calibrated survey meter with all inspections to assure that the sources are maintained in a safe position inside the cameras or source changers.
- .5 Using the Gamma Industries drawing of the source cable, disconnect and drive cable disconnect dimensions, measure the castings and compare the measurements with the drawing dimensions. If these dimensions are more than .020 out, the casting will be replaced. A close visual inspection will be made, looking for excessive worn areas, cracks, or bends. These castings will also be inspected with Dye Penetrant material to make sure there are no cracks in them.
- .6 Inspect the drive cable tube connection for damaged threads. Inspect the source guide tube, attachment nipple on the camera for cracking at the camera surface and inspect the locking groove for worn flat spots. Shake camera housing to assure that the shielding is tight.

3.2 Tech/Ops Crank Type Exposure Devices -  
Model 660, 800, 920 and 680

- .1 Survey the exposure device.
- .2 Inspect the exposure device for loose or missing hardware. Replace or tighten as required. Examine sealed source exit fitting. Nut should rotate freely without excessive shake. Look into exit port and check concentricity of source tube with nut. Misalignment, if found, indicates a damaged housing or shifting of the shield within the housing. This must be repaired by Tech/Ops. Do not disassemble the shield assembly.
- .3 Remove and coil the source drive cable by cranking control in the "EXPOSE" direction. Inspect cable for kinks, fraying, broken wires or rust. Minor bends in the cable may be straightened by hand. Do not use pliers. A cable with frayed or broken wires must be replaced. Light rust may be removed by hand wire brushing. Do not use a power wire brush or abrasives. Heavy rust that has penetrated into the cable will cause unsatisfactory operation or complete failure and the cable should be replaced.

.3 Cont'd:

Clean the coil of cable by immersing it in solvent. A heavy accumulation of dirt laden lubricant may require more than one washing.

Inspect the connector for wear using the Tech/Ops Model 550 Connector Gauge. Replace if connector fails at any gauged dimension. Inspect cable attachment to connector for straightness and evidence of looseness. Repair any bend at this time. DO NOT fabricate or fasten a replacement connector to the cable. The connector is a special heat treated steel made to exacting tolerances and under strict metallurgical control. The attachment is swagged with special tools and proof tested. Contact the RPO or ARPO for replacement.

Lubricate the cable with Shell Aero #7 grease or equal. Handle the cable with care to avoid picking up dirt or grit.

- .4 Remove the control cable tubes from the control box housing. Then remove the crank handle and control box housing and disassemble. Wash parts in solvent. Check inside of housing for evidence of galling and wear. A deeply scored (more than .020" deep) line where the cable contacts the inner wall of the housing indicates the need for replacement.

Check clearance between the hubs of the wheel and the bushings. More than .005" clearance indicates replacement is necessary.

Inspect drive wheel for damage. A bent tooth may be filed off. Replace the drive wheel if there are two or more adjacent bent teeth.

Lubricate bushings and reassemble.

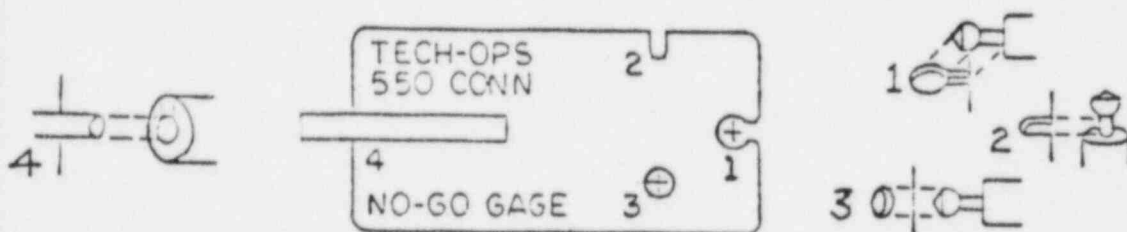
- .5 Check the control cable tubes for internal damage by flexing the tubes by hand. Internal damage to the reinforcing braiding or flexible metallic tube will be evidenced by a crunchy feeling when the cable tube is flexed. Cut, flattened or burnt cable tubes should be replaced. Superficial cuts or burns may be sealed and reinforced with tape. Clean tubes by pouring a few ounces of solvent into the bore and blow out with low pressure air of not more than 20 psi. Do not allow solvent to remain in the tubes. Do not immerse tubes in solvent. Check end fittings for correct attachment.

- .6 Inspect the source guide tubes for cuts, burns and crushed tubes. Check guide tubes for proper fit and assembly. Clean bore of tube with a solvent and drain promptly. Do not immerse guide tubes in solvent. Check for free passage of sealed source by holding the tube vertically and dropping a dummy sealed source assembly through the tube. The dummy sealed source assembly shall fall freely through the tube.
- .7 Reassemble the crank assembly and connect the control cables.
- .8 Each time a sealed source is exchanged, while both the new and old sealed sources are in the source changer, pour an ounce of solvent through the exposure device from the connector end and drain. Then install a dummy sealed source and operate the exposure device several times to assure proper function.
- .9 Remove the dummy sealed source and transfer the new radioactive sealed source from the source changer to the exposure device, then lock the exposure device.
- .10 Survey the exposure device.

.11 TECH/OPS 550 CONNECTOR GAUGE:

This gauge is used for checking the critical areas of the Tech/Ops source connector for excessive wear. All positions are NO-GO and connectors should NOT PASS THROUGH the gauge. DO NOT USE EXCESSIVE FORCE WHEN PERFORMING THIS TEST. Connectors that fail this test MUST be replaced.

Old Type Gauge



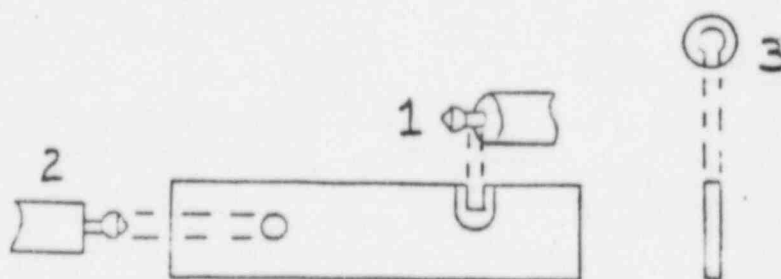
**MALE DRIVE CABLE CONNECTOR**

- Position No. 1 - Ball Shank Length
- Position No. 2 - Ball Shank Diameter
- Position No. 3 - Ball Diameter

**FEMALE SOURCE CABLE CONNECTOR**

- Position No. 4 - Source Connector Hole

New Type Gauge



**MALE DRIVE CABLE CONNECTOR**

- Position No. 1 - Ball Shank Diameter
- Position No. 2 - Ball Diameter

**FEMALE SOURCE CABLE CONNECTOR**

- Position No. 3 - Source Connector Slot Width

### 3.3 Tech/Ops Vacuum Operated Exposure Device - Model 616

- .1 Survey the exposure device.
- .2 Check the exposure device lock for correct operation.

With all safety precautions in effect and the locked exposure device connected to the control unit, pump a vacuum of at least 15" Hg and move the control valve to the "ON" position. Watch the survey meter to determine if the sealed source stays locked in the shielded position. If the sealed source is exposed during this test, contact the RPO or ARPO for instructions.

- .3 Inspect vacuum tube for cuts or other damage. Check for vacuum tightness by pumping a vacuum of at least 15" Hg. Place thumb over end of vacuum hose fitting and move the control valve to the "ON" position. Vacuum will drop approximately 2" or 3" Hg, then stabilize and hold. When thumb is released, gauge reading should drop to zero.
- .4 If a leak is determined to be in the Model 694 control unit by the test described in 3.3.3, inspect and tighten all connections and hoses and test again. If unit still leaks, test the control valve and check valves and replace if faulty or obtain a new control unit.
- .5 Survey the exposure device.

If items inspected are found not functioning properly they will be corrected immediately. If the Radiation Protection Officer is unable to correct them, the camera/exposure device will be sent to the manufacturer for repairs.

#### 4.0 JOB SITE INSPECTION FORM (QUARTERLY) (OS 9)

- 4.1 At a minimum of every 90 days, each radiographer will be observed unannounced and the 'Job Site Inspection Form' (OS 9) completed.
- 4.2 Should there be non compliance with the required procedures, a warning will be issued with a follow up visit to assure that the radiographer is observing safe operations. Dismissal will result from repeated non compliance.

#### 8.0 ASSISTANT RADIOGRAPHERS:

The Assistant Radiographers will know and be responsible for the following duties:

- 8.1 They must read and understand the NRC regulations, and also the Operating and Emergency Procedures for Western Stress Inc.
- 8.2 They must follow the Operating and Emergency Procedures of Western Stress Inc.
- 8.3 They will operate the sealed source equipment and make proper exposures, along with taking surveys under the direction and assistance of a radiographer.

#### 9.0 INTERNAL AUDIT: Performed by the Auditing Team

Reports of inspection of equipment, radiographers, or jobsites will be submitted to the RPO.

The RPO shall determine the corrective action required for any deficiencies found during the inspections.



2. Handling and Use of Licensed Sealed Sources and Radiographic Exposure Devices.

2.1 Subject:

- 2.1.1 This procedure establishes the requirements and procedures required by the NRC for handling and transporting radioactive sealed sources.
- 2.2.2 Any special requirements required by the NRC or customer not covered in the procedure will be written as an appendix to this procedure.

2.2 Responsibilities for Overall Radiation Protection Program:

- 2.2.1 The responsibility for the radiation protection program shall rest with the radiographers working for Western Stress, Inc. under the direction of the RPO and ARPO.
- 2.2.2 The RPO or ARPO shall check all radiographic personnel at the job sites at least once every 90 days to ensure that the personnel are following the NRC requirements and regulations and these procedures.

2.3 Production Personnel:

- 2.3.1 Radiographers shall have the authority to use and supervise the use of the sealed sources for which the company is licensed. The radiographers will be held responsible for seeing that all NRC regulations and company procedures are followed.

2.4 Sealed Sources and Devices:

- 2.4.1 The company is licensed to use only the sealed sources and devices designated on its license; a copy of the current license is attached to these procedures.
- 2.4.2 Instruction for the safe use of these devices are outlined in Attachment A of these procedures.
- 2.4.3 Each device containing a sealed source is to be clearly labeled with the radiation caution symbol and the words, "Caution Radioactive Material." Also, each shall carry a label or tag plainly stating the kinds of radioactive material contained in the device, together with the quantities. Radiographers are responsible for keeping equipment in their possession properly marked or labeled.

(Handling Radioisotopes O.P. Continued)

- 4.3 All restricted areas must be kept under constant surveillance by the radiographer or radiographer's assistant. Rope, radiation signs, and red flasher warning lights, provided by the company, shall be used to designate the perimeter of the restricted area.
  - 4.4 Personnel working in the surrounding areas shall be notified when a series of exposure are to be made.
  - 4.5 Personnel who have no need to enter a restricted area or who are not adequately monitored and aware of the radiation field, must not be allowed to enter a restricted area. If unauthorized personnel cannot be prevented from entering the area, the source should be immediately returned to its shielded position.
5. Personnel Monitoring Procedure and Equipment:
- 5.1 Procedures
    - 5.1.1 Pocket dosimeters and TLD or film badges are issued to each member of the company working with or around the sealed sources.
    - 5.1.2 Dosimeters and TLD or film badges must be worn at all times by radiographic personnel during radiographic operations.
    - 5.1.3 Pocket dosimeters and TLD or film badges are stored in a rack in the film viewing room and storage room or when at a field site, they will be stored in a lead lined storage box in the portable darkroom.
    - 5.1.4 TLD or film badges and dosimeters are to be returned to this rack at the end of each day or work assignment.
    - 5.1.5 TLD or film badges will be turned in every month.
    - 5.1.6 Dosimeters are to be recharged to 0 or as close as possible but below 10 mr at the beginning of the working shift.
    - 5.1.7 Dosimeter readings at the beginning of the shift will be recorded on the Inspection Utilization and Dosimetry Log.

(Handling Radioisotopes O.P. Continued)

- 5.1.8 Dosimeters are to be read after each field job during your daily shift, or at the end of the working day. This reading shall be entered in the appropriate space on your daily work sheet. If a dosimeter is found to be off scale, an emergency situation shall be considered to exist and the corresponding TLD or film badge shall be immediately taken to the Radiation Protection Officer. the Radiation Protection Officer, in turn, will send the badge in for immediate processing.
- 5.1.9 All Inspection Utilization and Dosimetry Logs are to be checked by the Radiation Protection Officer.
- 5.1.10 Radiographic personnel shall be removed from exposure to radiation when necessary to keep their individual dosages from exceeding 1.250 REM per quarter, or 3 REM if they have a banking account.

5.2 Personnel Monitoring Equipment

- 5.2.1 Each person working with or around the sealed sources shall be issued a TLD or film badge and a dosimeter. The TLD or film badge and dosimeter will be worn each day you are working with or around the sealed sources.
- 5.2.2 Dosimeters are delicate instruments, and should be treated as such. Jarring or dropping the instrument could cause a high reading. Also excessive humidity may cause a high reading. If damage to your dosimeter is suspected, take it to the Radiation Protection Officer.
- 5.2.3 The dosimeters used are the Dosimeter Corp. Model 862 or Victoreen Model 541/R or equal. They will be charged with the Lansverk Model L-24K charger, the Victoreen Model 2000-A charger, or the Dosimeter Corp. Model 9000 charger or equal.
- 5.2.4 Dosimeters measure the amount of radiation received up to 200 mr.
- 5.2.5 Film badges or TLD badges shall be supplied as follows:

Film Badges: R.S. Landauer Jr. & Company  
Glenwood Science Park  
Glenwood, Illinois 60425

TLD Badges: Morrison-Knudsen Company  
P.O. Box 7808  
Boise, Idaho 83729

(Handling Radioisotopes O.P. Continued)

- 5.2.6 Broken or damaged TLD badges, film badges, or dosimeters will not be worn. They will be taken to the Radiation Protection Officer who will see that repairs are made, or new replacements are issued.
- 5.2.7 No pocket dosimeters, film badges, or TLD badges will be worn by another person other than the one it is assigned to.
- 5.2.8 Extra dosimeters and TLD badges or film badges are available for visitors and other persons who may need them.

6. Methods and Occasions for Locking and Securing Radiographic Exposure Devices, Storage Containers and Sealed Sources

- 6.1 All of the radiographic exposure device provided by Western Stress, Inc. are equipped with locks designed to prevent unauthorized or accidental removal or exposure of the contained sealed sources.
  - 6.1.1 These devices shall be kept locked at all times except when under the direct surveillance of a radiographer or radiographer's assistant.
  - 6.1.2 Storage containers shall be kept locked when containing

## ATTACHMENT A

- 1.0 Radiographer's Operating Procedures for Field Sites
- 2.0 Detailed Instructions
  - 2.1 Gamma Century
  - 2.2 Gulf Nuclear 20V, 40V
  - 2.3 Gammatron Cobalt
  - 2.4 Tech/Ops
- 3.0 Personnel Monitoring Equipment
  - 3.1 TLD Film Badges
  - 3.2 Dosimeters
  - 3.3 Dosimeter Calibration
- 4.0 Calibration of Survey Meters

## ATTACHMENT A

### 1. Radiographers Operating Procedure for Field Sites:

- 1.1 This Procedure will be followed by all Radiographers and Radiographer's Assistants when assigned a Radiography job at a field site.
- 1.2 For all radiographic jobs lasting only one day at a temporary job site, this procedure, Attachment A, will be followed.
- 1.3 For all radiographic jobs lasting more than two days, this procedure will be followed for the total time required.
  - 1.3.1 Radiographer and Radiographer's Assistants (if any) will take their film badge or TLD badge and dosimeter from the film badge rack located in the viewing and storage room.
  - 1.3.2 Charge dosimeter on the charger to read zero, or as close to zero as possible, but no higher than 10 mr.
  - 1.3.3 Take survey meter, work sheet, and equipment inspection sheet from the office.
  - 1.3.4 Unlock source storage room.
  - 1.3.5 Set survey meter on the highest scale, 0 to 1000 mr, and make the source survey of camera located in the source storage area. Adjust scale to obtain exact mr reading. Take the survey reading 6 inches away from surface of the camera.
  - 1.3.6 If the reading is higher than 50 mr at 6 inches, notify the Radiation Protection Officer.
  - 1.3.7 Fill in the information required on the work sheet form, such as dosimeter reading, source survey reading, job site location, and customer, etc. (AA 17, AA 18).
  - 1.3.8 Radiographer will then make the inspection of equipment using the equipment inspection sheet check off list, Page AA 17, and following the inspection - maintenance procedure, Attachment B.



(Attachment A Continued)

- 1.3.47 After completing all exposures required at the job site or for the normal working hours, make a survey of the camera with the survey meter to assure that the source is in the safe position inside the camera. Record on Inspection, Utilization & Dosimetry Log (AA 17).
- 1.3.48 Lock device.
- 1.3.49 Snap source cable from face of head shield.
- 1.3.50 Replace plug into opening in face of head shield.
- 1.3.51 Unthread control cable adapter.
- 1.3.52 Disconnect small source pigtail from control cable.
- 1.3.53 Replace plug into fitting directly behind the lock box.
- 1.3.54 Return device to safe storage area in dark room.
- 1.3.55 Lock storage area.
- 1.3.56 If source cannot be returned to locked storage area or otherwise physically secured, assign a radiographer or his assistant to establish safe area around device and to keep unauthorized persons from the area.
- 1.3.57 Fill in completely the work sheet requirements. (AA17, AA 19)
- 1.3.58 After you have loaded your equipment into the transporting vehicle, notify the individual in charge at the job site that you are finished with your radiography.
- 1.3.59 Then notify the Radiation Protection Officer at the home office that you are on your way back to the shop. If the Radiation Protection Officer is not in the office, then notify the next on the list. If your departure is after normal working hours, notify the RPO at his home.
- 1.3.60 Proceed back to the shop.
- 1.3.61 If you have an automobile accident, follow the instructions of page AC 3 in Attachment C - Emergency Procedures.
- 1.3.62 Unload your equipment and source and place into the shop storage room. Survey camera to make sure the source is inside the camera.



(Attachment A Continued)

- 1.3.63 Read Dosimeter and record reading on the Inspection Utilization and Dosimetry Log., (AA 17) and Monitoring Report (AA 18).
- 1.3.64 Return TLD badge or film badge and dosimeter to storage rack in film viewing room.
- 1.3.65 Place completed paper work, work sheets , and inspection sheets in appropriate marked file in Assistant Area Superintendent's office.

## 2.4 Tech/Ops

- 2.4.1 At the exposure location, position the source snout end or the exposure device using jigs or other attachments. Place the film at the desired location(s) to be radiographed. With crank type exposure devices always use the shortest source tube possible consistent with safe operation.
- 2.4.2 When applicable, remove the shipping plug and connect the source guide tube to the exposure device.
- 2.4.3 As applicable, connect the source drive cable or control vacuum hose to the exposure device.
- 2.4.4 Clear the Restricted Area of unauthorized personnel and keep the area under surveillance during the exposure operation.
- 2.4.5 Unlock the exposure device and move the sealed source into the exposure position. Observe the survey meter during the exposure operation to be sure the sealed source is in the desired location.
- 2.4.6 After the radiographic exposure, return the sealed source to the shielded position in the exposure device.
- 2.4.7 Using a survey meter, the Radiographer, or Assistant Radiographer under the supervision and direct surveillance of the Radiographer, shall approach and survey the exposure device, and source guide tube if applicable, to assure that the sealed source is in the shielded position.
- 2.4.8 Lock the exposure device.
- 2.4.9 Before moving the exposure device to a new area or to storage, lock the exposure device and remove the key from the lock. Then remove the cables or tube, etc., and replace the shipping plugs if applicable.

3. PERSONNEL MONITORING EQUIPMENT AND CALIBRATION PROCEDURE

- 3.1 Film badges supplied by R.S. Landauer Jr. & Co. or TLD badges supplied by Morrison Knudson Co. are assigned to each employee who works with or around the sealed sources. The badges are changed on a monthly basis.
- 3.2 Dosimeters worn by each employee working with or around the radioactive sources are Victoreen Model 541/R or Dosimeter Corporation Model 862 or equal. These dosimeters have a range of 0 to 200 mr.
- 3.3 Dosimeters shall be calibrated every 12 months by Stabro Laboratories, Salt Lake City, Utah or other calibration laboratories as approved by the RSO/RPO.

4. CALIBRATION OF SURVEY METERS

- 4.1 Survey meters shall be calibrated every three months by an approved calibration laboratory. Records will be kept for 2 years.

5. DOSIMETER AND SURVEY METER SERVICE AGENCIES

- 5.1 The following companies are approved to calibrate dosimeters and/or survey meters:
  - .1 Stabro Laboratories  
Salt Lake City, Utah
  - .2 Tech/Ops, Inc.  
Houston, TX
  - .3 Tech/Ops, Inc.  
Burlington, Mass.
  - .4 Radiation Services  
Houston, Texas
  - .5 Indelco  
Seattle, Wash.

ATTACHMENT D

1. Leak Tests and Source Changes
2. Source Changing Operations
3. Shipping Sources and/or Source Changers Back To Supplier
4. Instructions For Use of Leak Test Kits
5. Leak Test Results

## ATTACHMENT D

### 1. Leak Test and Source Changes:

- 1.1 Sealed sources that are kept six months or longer will be wipe tested by a radiographer or the Radiation Protection Officer. The wipe test will be made using a Gulf Nuclear Model LTK-1 Leak Test Kit, or Tech/Ops, Inc. Model 518 Leak Test Kit.
- 1.2 Only radiographers shall perform leak test and source changes. This will be done in accordance with Section 6, p. AD 4. Assistant Radiographers will assist with the operation only.
- 1.3 A survey of the shipping container when it is received from the source shipper, will be made at the freight pick up dock. This could be at the Air Freight Dock or Truck Lines Dock. A reading will be taken at three feet and at the surface of the shipping container. These readings will be recorded on the form Shipments of Incoming/Outgoing Source Inspection. If you obtain a reading of over 200 mr at the surface, notify the Radiation Protection Officer for instructions.
- 1.4 All source changing equipment shall be inspected for damage before a source change is made. Visual damage or suspected damage will be reported to the Radiation Protection Officer. No source change will be made until the Radiation Officer has inspected the damage and authorized the source change.

### 2. Source Changing Operations

- 2.1 Ir 192 (Crank Type Exposure Devices - ONLY)
  - .1 Set up a Restricted Area.
  - .2 Move the exposure device, source changer, control cable and guide tube to the Restricted Area and position for transfer.
  - .3 Remove shipping plugs and seals. Using the shortest guide tube possible, connect the exposure device to the empty compartment of the source changer.
  - .4 Connect the control cable to the exposure device. Unlock the exposure device and crank the sealed source into the source changer. Note the survey meter during the transfer to be sure the sealed source is in the desired location.
  - .5 Using a survey meter the Radiographer shall approach the exposure device and source changer and survey the exposure device, source changer and source guide tube to assure that the sealed source is in the shielded position.

## 2. Source Changing Operations

### 2.1 Ir 192 (Crank Type Exposure Devices - ONLY) Cont'd:

- .6 Disconnect the drive cable from the old sealed source and remove the source guide tube from the source changer.
- .7 Connect the source guide tube to the replacement source compartment of the source changer. Connect the drive cable to the replacement sealed source.
- .8 Crank the replacement sealed source into the shielded position of the exposure device, noting the survey meter during the transfer to assure the sealed source is in the desired location.
- .9 Using a survey meter, survey the exposure device, source changer and guide tube to assure that the sealed source is in the shielded position.
- .10 Lock the exposure device and remove drive cable and guide tube. Replace shipping plug, storage cover, etc.
- .11 Bolt the source changer hold down cap in place and install a seal wire. Next, bolt the cover in place and install a seal wire.
- .12 Wind up the control cable and guide tube.
- .13 Move the exposure device and source changer to the storage area.
- .14 Remove all radiation signs, ropes and access controls.
- .15 Survey the devices when they are placed in the storage area and record meter readings.

### 2.2 Co 60 (All Exposure Devices)

- .1 All Co <sup>60</sup> exposure devices shall be returned to the manufacturer or sealed source supplier for sealed source replacement or exchange.

## 3. Shipping Sources And/Or Source Changers Back To Supplier

- 3.1 Check the exposure device or source changer to assure that all shipping plugs, seal wires, locks, etc. are in place.
- 3.2 When a shipping drum or overpack is the shipping package used:
  - .1 Assure that pig hair, foam rubber or other packing material is in place to protect the fire insulation and prevent the enclosed exposure device from shifting during shipment.

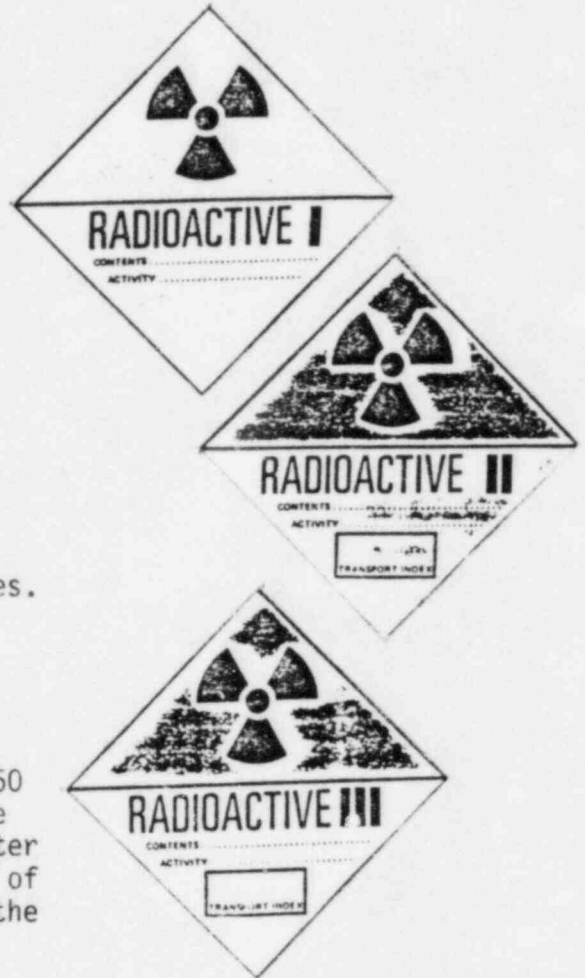
3.2 Cont'd:

- .2 Check the integrity of the fire resistant insulation shield.
  - .3 Check for proper operation of the drum locking ring and bolting or fastener device.
- 3.3 Nonconforming or damaged shipping packages or parts shall be tagged or marked and the District Radiation Safety Personnel notified for instructions. DO NOT SHIP nonconforming or damaged shipping packages.
- 3.4 Place the decay chart (and source changer tube if applicable) in the shipping package.
- 3.5 Attach a security seal to the shipping package:
- .1 At the shipping plug or source indicator knob for exposure devices.
  - .2 At the bolt heads of the cover for source changers and overpacks.
  - .3 At the locking ring-bolt head for shipping drums.
- 3.6 Survey the shipping package to assure that the radiation level does not exceed 200 milliroentgens per hour at the external surfaces or 10 milliroentgens per hour at one meter (3.3 feet) from the surfaces. Record this reading on the Shipments of Incoming/Outgoing Source Inspection Form. (AD5)



- 3.7 Each shipping package must be labeled with the appropriate radioactive labels affixed to opposite sides of the shipping package or crate.

- .1 Use Radioactive White I Label if the radiation intensity is 0.5 MR/HR or less at the surface of the shipping package.
- .2 Use Radioactive Yellow II Label if the radiation intensity is 50 MR/HR or less at the surfaces of the shipping package and is 1 MR/HR or less at a distance of one meter (3.3 feet) from the surfaces.
- .3 Use Radioactive Yellow III Label if the radiation intensity is greater than 50 MR/HR at the surface of the shipping container or greater than 1 MR/HR at a distance of one meter (3.3 feet) from the surface.



- 3.8 Fill out the information on the shipping labels as follows.

- .1 Contents
  - a. Type of Radioisotope; i.e., Iridium 192, Cobalt 60, or depleted Uranium.
- .2 Activity
  - a. For Iridium or Cobalt, read the value from the decay chart.
  - b. For depleted Uranium use .005 Ci.
- .3 Transport Index: For Yellow II or III Labels this is the radiation intensity measured at one meter (3.3 feet) from the surface of the shipping package.

- 3.9 Place an address label on the top of the shipping container.
- 3.10 Have a carrier's Bill of Lading made out and call the carrier for pick up or deliver the source shipping container to the carrier's dock.
- 3.11 Make out three copies of the Shipper's Certification for Radioactive Materials. Two are attached to the carrier's Bill of Lading and one is attached to a copy of the Bill of Lading and the Source Shipping Inspection Form.
- 3.12 File a copy of the Source Inspection Form, the carrier's Bill of Lading and the Shipper's Certification for Radioactive Materials in the source shipping record file.

#### 4. Instructions For Use Of Leak Test Kits

These kits are designed for use on Gamma Ray Exposure Devices. They provide a convenient and safe method of performing leak tests of radioactive sealed sources in accordance with NRC regulations, which require such tests at intervals of not more than six (6) months.

##### 4.1 Gulf Nuclear Model LTK-1 Leak Test Kit

- .1 With the capsule in the safe position in the camera, remove the safety plug and cable from source exit tube.
- .2 Dissolve the detergent in the packet in a small amount of water.
- .3 Remove the swab from the plastic container on the left and dip it into the water solution and proceed to wipe the source container inside the S tube exit port. Replace the swab in the plastic container from which it was removed.
- .4 Remove the dry swab from the plastic container on the right and repeat the wipe process. DO NOT dip this swab in the detergent. Replace this swab in the plastic container from which it was removed in the kit.
- .5 After wiping the tube, replace the safety plug and cable in the camera. Survey the swab just used. If you get a reading, report this to the Radiation Officer when you deliver the wipe test to him.
- .6 Fill in the source serial number and camera serial number on the Leak Test Packet Cover and give it to the Radiation Protection Officer for shipment to Gulf Nuclear.

## 4.2 Tech/Ops, Inc. Model 518 Leak Test Kit

### Contents

Flexible swab holder with swab  
Vial of EDTA solution  
Plastic Envelope  
Mailing Box  
Identification Sheet

- .1 Survey the exposure device to assure that the sealed source is in the shielded position.
- .2 Remove source guide tube from the front of the exposure device or remove shipping plug, if applicable.
- .3 Wet the swab with EDTA solution. Shake off the excess solution and:
  - a. For crank type exposure devices, insert the swab into the hole in the shield. Wipe the interior of the hole thoroughly by rotating the swab holder.
  - b. For vacuum type exposure devices, wipe around the Lock body, exhaust filter and intake filter.
- .4 Place the swab in the plastic envelope.
- .5 Survey the swab by turning the survey meter to its most sensitive range. Place the meter in a low background area and move the swab in its plastic envelope to the meter, not the meter to the swab.
- .6 If there is no indication on the meter, or if the indication is no more than 0.2 MR/HR above background, put the plastic envelope with the swab in the mailing box to send to Tech/Ops, Inc.
- .7 Include in the mailing box, the completed identification sheet.
- .8 If the swab shows more than 0.2 MR/HR, do not mail. Notify the RPO or ARPO for specific instructions.
- .9 If the survey meter available does not have the capability of detecting as little as 0.2 MR/HR, ship the swab to Tech/Ops, Inc., via express.
- .10 The swab will be subjected to a precise radio-assay when received by Tech/Ops, and a leak test certificate will be mailed promptly.

## 5. Leak Test Results

- 5.1 The leak test results (certificate) shall be filed in the source leak test file and shall be retained for a period of two (2) years.

## RADIATION SAFETY TRAINING PROGRAM

### PURPOSE

- A. To train Western Stress, Inc. employees, in the use and safe handling of radioisotopes in industrial radiography.
- B. To include the Safety Training Program as an integral part of the total Quality Assurance Program - NDT PERSONNEL QUALIFICATION AND CERTIFICATION PROCEDURE of the QAM Manual, to train qualified radiographers and assistant radiographers.
- C. To ensure that the radiographers and radiographers' assistants employed by Western Stress, Inc. shall have the necessary knowledge of safety practices in handling and use of radioisotopes. To ensure that they shall be competent to function within the guidelines of the Western Stress, Inc. OPERATING AND EMERGENCY PROCEDURES Handbook and the NRC TITLE 10, CHAPTER 1, CODE OF FEDERAL REGULATIONS, PART 19, 20 and 34, RADIATION SAFETY REQUIREMENTS FOR RADIOGRAPHERS AND RADIOGRAPHERS' ASSISTANTS.

### GENERAL:

- A. Information and literature for this training program are obtained from the following publications:
  - 1. NRC WORKING SAFELY IN GAMMA RADIOGRAPHY
  - 2. ASNT - NDT TRAINING PROGRAM - RADIOGRAPHY METHOD
  - 3. General Dynamics - PROGRAMMED INSTRUCTION HANDBOOKS FOR RADIOGRAPHIC TESTING, VOL. I, II
  - 4. Tech/Ops, RADIATION SAFETY HANDBOOK
- B. Instructors will be as follows:
  - 1. The RPO and /or ARPO will instruct the Radiographers Radiation Safety Training Program.
  - 2. The RPO and/or ARPO will instruct the Assistant Radiographers Radiation Safety Training Program.
  - 3. The RPO and/or ARPO will review all tests taken by each radiographer and assistant radiographer.

#### EXAMINATIONS AND RECORDS:

The following records and examinations shall be maintained in the individual trainees's file for a period of three years:

1. RSTP-ATT.1 Radiation Safety Requirements - Assistant Radiographer
2. RSTP-ATT.2 Written Exam - Assistant Radiographer
3. RSTP-ATT.3 Oral Exam - Assistant Radiographer
4. RSTP-ATT.4 Field Exam - Assistant Radiographer
5. RSTP-ATT.5 Radiation Safety Requirements - Radiographer
6. RSTP-ATT.6 Written Exam - Radiographer
7. RSTP-ATT.7 Field Exam - Radiographer

#### ANNUAL SAFETY REVIEW:

A minimum of four (4) hours class time will be scheduled to review NRC regulation changes or other relevant information.

J. Examinations:

J.1 Upon completion of Items A - I, the trainee shall take:

J.1.1 Written Exam - Assistant Radiographer RSTP-ATT.2  
Passing grade - 75%

J.2 The next working day in a field situation the instructor will administer:

J.2.1 Field Exam - Assistant Radiographer RSTP-ATT.4  
Passing grade - 100%

K. Upon satisfactory completion of Items A - J, the trainee will be designated an Assistant Radiographer and given a certificate indicating such.

United States Department of Commerce  
National Bureau of Standards



**Certificate of Accreditation**

R. S. LANDAUER JR. & COMPANY  
Glenwood, Illinois

is recognized under the National Voluntary Laboratory Accreditation Program  
for satisfactory compliance with criteria established in Title 15, Part 7a Code of Federal Regulations for:  
providing specific Personnel Radiation Dosimetry Processing Services



Effective until October 1, 1986

*John L. Donaldson*

For the National Bureau of Standards