

F. L. CLIFFORD ASSOCIATES

Radiation Safety and Training Consultants

P.O. Box 452

Niantic, Connecticut 06357-0452

(203) 739-8305

15 June 1987

United States Nuclear Regulatory Commission
Region-I
Nuclear Materials Safety & Safeguards Branch
King of Prussia, PA 19406

Subject; Materials License Number 06-02117-02

Gentlemen;

It is requested that subject license be amended as follows:

Item 1 & 2 : Change to: 321 Main Street - Box 452
Niantic, CT 06357-0452

Item 6 : Add G; Cobalt-60

Item 7 : Add G; Sealed Source, Tracerlab Mod. 663

Item 8 : Add G; No single source to exceed 1 millicurie.

Item 9 : Add G; For use in response testing installed area monitors
by open air method.

Condition 10: Change to: Licensed material may be used at 321 Main St.,
Niantic, CT and at temporary job sites anywhere
in the United States where the USNRC maintains
jurisdiction.

Condition 12: Add; Frank L. Clifford III (resume enclosed)

Two copies of Regulations & Procedures Manual are enclosed. Changes and/or
additions are as follows:

<u>Changes</u>	<u>Additions</u>
Cover	p.p. 5-4
p.p. 3-2	" 6-2
" 3-3	
" 4-2	
" 5-1	
" 7-2	

Amendment fee in amount of \$60 is enclosed and if you require any
additional information please contact me at 203-739-8305 between 0700 and
1500 hours daily.

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REG1 LIC30
06-12117-02 PDR

very truly yours;

F.L. Clifford
F.L. Clifford
Managing Director

Encls
FLC/gdb

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"OFFICIAL RECORD COPY"

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06-12117-02

Log	Jun 17
Remitter	Industrial Testing
Check No.	1093 1/21
Amount	\$60 F \$60 APR 21
Fee Code	3 N
Type of Fee	Amendment
Date Check Rec'd.	6/24/87
Date Completed	7/13/87
By:	S. Kimbrey

FRANK L. CLIFFORD III
28 PARKWAY SOUTH
NEW LONDON, CT 06320
D-O-B: 25 FEB 1966

RESUME

EDUCATION:

High School: St Bernard, Uncasville, CT - Graduated: June 1984

College: (1) Thames Valley Technical College, Norwich, CT
Attendance: 1984 - 1985 : Majors: Math, Physics, Chem.
(2) Mohegan Cumminity College, Norwich, CT
Attendance: 1985 - 1986 : Majors: Math, Physics.

Seminars: (1) Technical Operations Corporation, Burlington, MA.
(a) Radiation Safety (40 hrs) 1986
(b) Administrative Seminar (16 hrs) 1986
(c) Maintenance Seminar (16 hrs) 1986
(2) F.L. Clifford Associates, Niantic, CT
(a) Basic Radiation Safety (24 hrs) 1984
(b) Radiation Safety In Well-Logging (24 hrs) 1985
(c) Industrial Radiography Radiation Safety (40 hrs) 1986
(d) Radiation Safety Administration (24 hrs) 1986

Work Experience: F.L. Clifford Associates, Niantic, CT: Rad. Consultants

- (1) June 1981 to June 1984 (Approx 30 hrs/week)
Laboratory & office trainee. Observing all company activities (non-radiation) and training programs.
- (2) June 1984 to June 1986 (Approx 30 hrs/week)
Laboratory, maintenance & office assistant. Assisting in all company activities and training programs.
- (3) June 1986 to date (Full Time)
Assistant Laboratory Manager. Conducting all company activities. Licensed activities conducted under direct supervision as required by license conditions.

Rev: 0

Date: 6-15-87

Rev: 01

REGULATIONS AND PROCEDURES
GOVERNING USE OF RADIOACTIVE
MATERIALS.

FRANK L. CLIFFORD

Chapter One

Standards for Protection Against Radiation.

(Title 10, Part 20 C.F.R.)

Date 6-15-87

Rev: 01

MATERIALS LICENSE NUMBER 06-12117-02

FRANK L. CLIFFORD

CHAPTER TWO

RADIOACTIVE MATERIALS LICFENSE

Date: 9-15-78

Rev: 0

Chapter Three
Operating and Emergency Procedures

3.1 Responsibility

- a. The responsibility for the overall radiation safety program rests with P.L. CLIFFORD.

3.2 Sealed sources and devices.

- a. The company is licensed to use only the sealed sources and devices designated on its License.

3.3 Radiation detection instrumentation and devices.

- a. Calibrated and operable radiation survey meters will be maintained at each job site where calibrations are being conducted. Survey meters must be calibrated at least every 90 days and after each servicing.
- b. At all times when calibrations are being conducted the operator will wear a film badge and a pocket dosimeter.

3.4 Security of sealed sources and devices.

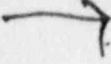
- a. All sealed sources and devices will be stored and locked when not in use.

3.5 Records

- a. Records shall be kept of receipt and disposal of licensed radioactive materials.
- b. Individual radiation exposure records shall be maintained on NRC #5 form.

3.6 Emergency Procedures.

- a. In the event of an emergency such as:
 - 1. Lost or damaged source
 - 2. Hung or detached source
 - 3. Fire or explosion
 - 4. Any other occasion that could cause a possible exposure to personnel
- b. Secure and lock source if possible.
- c. Where necessary set up restricted area.

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- d. Enlist aid of local Supportive Agencies (i.e. Fire, Police, C.D., N.R.C., Equip. Manufacturer)
 - e. Make required reports in accordance with current Title 10 CFR; State and Municipal regulations.

Date: 9-15-78

Rev: 0

Chapter Four
Description of Facilities

- 4.1 Sources are stored in a locked metal cabinet located in a storage room that is maintained locked except when occupied by qualified personnel,
- a. Room is: 30 ft long by 16 ft wide by 8 ft high.
 - b. Outer walls are constructed of 10" concrete and inner walls of masonry compound.
 - c. There is no occupancy possible either above or below facility.
 - d. Entrance is through a lock equipped door.
 - e. Radiation levels are maintained, at all time, less the 2 mr/hr at 18 inches from any outer surface of the facility.
- 4.2 During field operations sources are stored and locked in the transporting vehicle and the keys maintained by Clifford rep.

MATERIAL LICENSE NUMBER
06-12117-02

Chapter Five
Instrument Calibration Procedure

5.1 Preparation

- a. Plant Facility
 - (1) Set up calibration device in center of room and evacuate personnel
 - (2) Close facility door.
- b. Field Operations
 - (1) Select unoccupied area to conduct operation.
 - (2) Rope off and post "Radiation Area" signs at a distance of 15 feet in all directions around device and evacuate personnel.

5.2 Calculations

- a. Determine source activity and radiation level at 1 foot from device utilizing the following formulas:
 - (1) Cobalt-60: mr/hr @ 1 ft = 14 X millicuries of source
 - (2) Cesium-137: mr/hr @ 1 ft = 3.3 X millicuries of source
- b. Utilizing Inverse Square Law determine other required distances dependent on type of instrument to be calibrated:

$$\frac{I_1}{I_2} = \frac{D_2^2}{D_1^2}$$

5.3 Set up

- a. Position calibration unit on a table or support at least 15 feet long.
- b. Mark off various radiation levels at required distances calculated from procedure in para. 5.2
- c. Open instrument and check all batteries with voltmeter to assure proper voltages. (Note: on instruments with "battery" position on switch, do not rely on this as an indication of good batteries. Experience has proven this to be an unreliable and dangerous assumption.)
- d. Turn on instrument and allow to warm up 15 minutes.

5.4 Calibration

- a. Instruments will be calibrated at two or more points on each scale. The highest and lowest points will be separated by at least 50 % of the scale.
- b. If instrument's readings do not correspond to calculated values within a range of plus or minus 10% potentiometer adjustments will be made and the scales rechecked.
- c. If instrument's readings correspond to calculated values within a range of plus or minus 10% it will be considered to be properly calibrated.
- d. If an instrument cannot be adjusted to fall within the plus or minus range it will be sent to manufacturer or qualified instrument repair facility for repair and calibration.
- e. Instruments having a range of up to 1000 mr/hr or less will be calibrated using either 10 millicuries of Co-60 or 90 millicuries of Ce-137.
- f. Instruments having a range of from 1000 mr/hr up to 2000 mr/hr will be calibrated using at least 90 millicuries of Ce-137.
- g. In addition to the foregoing requirements calibrations will be conducted as follows:
 - (1) On instruments equipped with a "zero" adjustment, set switch on "zero" and adjust meter to read "zero".
 - (2) Unlock calibration unit and expose source.
 - (3) Starting at lowest meter scale and proceeding through highest meter scale calibrate as outlined in above paragraphs.
 - (4) At completion of calibration shield and lock calibration unit.
 - (5) Turn instrument to "off".
 - (6) Affix calibration sticker to instrument and record date of calibration.

DOSIMETER MAINTENANCE AND CALIBRATION PROCEDURE FOR SELF-READING X AND GAMMA SENSITIVE DOSIMETERS.

- I This procedure describes the maintenance and calibration of self-reading dosimeters as follows:

<u>Instrument</u>	<u>Range</u>
Low Range	0-200 mr
Low Median Range	0-500 mr
Median Range	0-1 R

A Leakage Test

1. Purpose
 - a. The purpose of this test is to determine the ability of dosimeters to retain their charge.
2. Procedure.
 - a. Clean dosimeters with grain alcohol utilizing a cotton swab paying particular attention to both optical and charging ends. Carefully dry and check for cleanliness. If necessary repeat procedure.
 - b. Charge dosimeter until a zero reading is obtained.
 - c. Ground the diaphragm electrode to barrel of each instrument.
 - d. Record reading of each instrument by serial number.
 - e. Place dosimeters in a low background area for the following periods:

<u>Instrument</u>	<u>Test Time</u>	<u>Leakage Limit</u>
0-200 mr	24 hrs	4.0 mr
0-500 mr	24 hrs	10.0 mr
0-1 R	24 hrs	0.02 R

- f. At the end of testing time record reading of each instrument.
- g. Calculate leakage of each instrument.
- h. If leakage limit is exceeded, retest instrument. If retest fails, instrument should be considered defective.

B. Calibration

1. Purpose
 - a. To determine the accuracy of the dosimeter.
2. Procedure.
 - a. Charge dosimeters until zero reading is obtained.
 - b. Ground the diaphragm electrode to barrel of each.
 - c. Record dosimeters by serial number.
 - d. Place dosimeters on dosimeter holder and expose to radiation intensities as follows recording readings after each exposure.

<u>Instrument</u>	<u>Intensity</u>	<u>Limit</u>
0-200 mr	50 mr	± 30% MAXIMUM
	150 mr	"
0-500 mr	150 mr	"
	450 mr	"
0-1 R	.250 R	"
	.750 R	"

- e. The maximum error will be ± 30% or as requested by Client.

C. Records

1. Records will be provided of results of all testing.
2. A calibration sticker will be attached to each instrument.

Chapter Six
Source Leak Testing

6.1 All sources will be leak tested at intervals not to exceed 6 months. Rev: 01
records will be maintained of results of leak tests.

6.2 Leak test results will be determined utilizing a Ludlum 1000 or Eberline RM-14 scalers in conjunction with thin window G-M detectors.

6.3 Procedure:

- a. Determine background by conducting a 10 minute count and converting to counts per minute.
- b. Determine efficiency of scaler by counting reference source for 10 minutes under same geometric conditions as sample will be counted and converting to counts per minute.

$$\text{Eff} = \frac{\text{cc/m (reference source)}}{\text{d/m (reference source)}} \times 100$$

c. Conduct leak tests as follows:

1. Models 571, 64-764 & 773 calibration units:

- (a) Wet patch with detergent solution (i.e. EDTA).
- (b) Unlock calibration unit and withdraw source rod with unit pointed away from body.
- (c) Wipe entire length of source rod with wet patch. Repeat procedure with a dry patch.
- (d) Place each patch in separate plastic envelopes.
- (e) count patches as per following procedure.

2. Open air sources or exposure devices & storage containers.

- (a) Wet patch with detergent solution (i.e. EDTA)
- (b) Collect sample as follows:
 - (1) Open air source: Remove source from storage container and wipe inside source storage area with both wet and dry patch. Return source to storage container.
 - (2) Exposure devices & Storage Containers: In the case of storage containers the procedure for open air sources will be followed. During the procedure the source will either have to be placed in another storage container or in an exposure device. Exposure devices can be tested with the source contained inside them by removing the front outlet port plug or cover and conducting wipe procedure of inside area of front of port utilizing both dry and wet patch. DURING THIS PROCEDURE CARE MUST BE TAKEN THAT SOURCE DOES NOT MOVE OUT OF STORED POSITION WHEN TESTING DEVICES THAT ARE NOT EQUIPPED WITH REAR LOCKING MECHANISMS (I.E. T/O 440, 500, etc.) ARE BEING TESTED.

d. Sample counting:

- (a) Count samples for 10 minutes and determine counts per minute.

$$\mu\text{Ci} = \frac{(\text{cc/m sample})}{(2.22 \times 10^6) \times (\text{eff})}$$

- e. Any samples in excess of .005 μCi will be cause for reporting in accordance with Part 20 10 CFR.

CHAPTER SEVEN

PROCEDURES FOR INSPECTION AND MAINTENANCE OF RADIOGRAPHIC EQUIPMENT.

I Radiation Safety

1. At all times when inspection and maintenance procedures are in progress, all personnel will wear personnel monitoring equipment as required by 10 CFR, 34.33
2. Additionally, at least 1 radiation survey meter as described in 10 CFR, 34.24 will be available and used at the site where inspection and maintenance is being conducted.
3. Prior to the commencement of any procedures, devices will be radiation surveyed, utilizing a radiation survey meter, to assure they conform to the requirements of 10 CFR, 34.21.
4. All inspection and maintenance procedures will be conducted by Clifford rep. in the company of the respective Licensees authorized representative. This representative will be an individual qualified to operate exposure devices and associated source changer/shipping containers in accordance with the terms and conditions of the Licensees byproduct material license.

II Periodic Inspection and Maintenance.

1. Periodic inspection and maintenance should be performed of radiographic equipment at least every 3 months and after any prolonged storage. Additionally, equipment subjected to severe operating conditions should be inspected and maintained at more frequent intervals.

III Inspection and Maintenance Equipment and Materials.

1. Appropriate source changer/shipping container. (When available)
2. 12" diameter basin or cake pan.
3. Wrenches, screwdrivers, allen keys, pliers, etc.
4. Solvent, non-caustic. (i.e. kerosene, perchlorethylene)
5. Low pressure air supply. (less than 20 p.s.i.)
6. Lubricant conforming to mil. spec. no. G23827A. (i.e. Texaco "unitemp")
7. Appropriate "dummy" source assemblies.
8. Radiation survey instrument.
9. Fibre optics boroscope.
10. Micrometer, calipers, feeler gauges.
11. Appropriate manufacturers connector gauges. (i.e. T.O. 550, B.I. "out-of-round checker")
12. Syringe
13. Appropriate drive cable connector.
14. Volt-ohmmeter
15. WD-40 cleaner lubricant.

IV. Procedures

1. Control Units

- a. For units with non-detachable control units source must be transferred to appropriate source changer before this procedure can be conducted. This process will be accomplished by Licensees authorized representative. If source changer is not available, it is impossible to perform this function.
- b. Remove drive cable being carefull to neatly coil.
- c. Examine cable for kinks, frays, broken wires, dirt, rust, foreign material, etc.. Severe kinks, frays, broken wires and heavy rust will be cause for replacement of drive cable.
- d. Remove light rust by use of a medium hand wire brush. Do not use power brush or any abrasives.
- e. Rinse cable by immersing in solvent. If necessary repeat procedure until cable is clean. Dry cable with low pressure air.
- f. Examine cable connector for straightness and any evidence of looseness. Looseness or severe bends will be cause for replacement of cable. Cables in need of repair must be returned to appropriate manufacturer for repair.
- g. Conduct dimensional examination of cable connector. This will be done utilizing appropriate manufacturers connector gauge when available. Replace drive cable if connector fails at any gauged dimension. If dimensional gauge is not available this inspection will be conducted by visual and dimensional comparison utilizing a manufacturers supplied connector of same model number. Any evidences of excessive wear or dimensional change that could effect the safe operation of the device will be cause for replacement of drive cable.
- h. Lubricate drive cable with a fine coating of mil. spec. no. G23827A lubricant.

2. Control Cranks

- a. Remove control cable housings.
- b. Remove crank unit from operating assembly and disassemble.
- c. Wash parts in solvent until clean and dry with low pressure air.
- d. Visually inspect housing internals for any evidence of galling or wear. Any scored areas greater than .020" deep will require replacement of housing.
- e. Visually inspect clearances between hubs, wheel and bushings. Any clearances in excess of .005" will require replacement of part.
- f. Visually inspect drive wheel teeth for any evidence of wear-down or breakage that could result in slippage. Replace where necessary.
- g. Lubricate inner surfaces and bushings with fine coating of mil. spec. no. G23827A lubricant and reassemble.

3. Control Cable Housings.

- a. Visually inspect each housing for evidence of out-of-round, fraying, deep cuts, deep burns or loosening of fittings. Any of these conditions will require replacement of housing. Superficial cuts or burns will be sealed and reinforced with tape.
- b. Inspection for internal damage will be conducted by flexing the housing over its entire length. A "crunch" feeling is indicative of internal damage and will require replacement of housing.
- c. Flush housing by syringing with solvent until clean. Immediately dry with low pressure air. Do not soak housings in solvent.
- d. Reassemble drive unit and insert drive cable back into cable housing.

4. Source Guide Tubes.

- a. Visually inspect each one for any evidence of "out-of-round, fraying, deep cuts, deep burns or loosening of fittings. Any of these conditions will require replacement. Superficial cuts or burns will be sealed and reinforced with tape.
- b. Examine any screw threads or connection fittings for visible damage or impairment of function. Replace any tubes with damaged fittings.

- c. Inspect internal dimension of guide tubes by dropping appropriate "dummy source" through tube. If "dummy" does not fall free when tube is held vertically, tube must be replaced.
- d. Flush tubes by syringing with solvent until clean. Immediately dry with low pressure air. Do not soak tubes in solvent.

5. Shield Assembly

- a. If not already done, transfer source to appropriate source changer. This process will be accomplished by Licensees authorized representative. If source changer is not available, only steps b,c,d,g,h & i can be accomplished.
- b. Check exterior for loose or missing hardware. Replace or tighten as required.
- c. Examine exterior for required labels and warning symbols. Replace as required.
- d. Remove shipping plug and examine exit port for concentricity. Misalignment indicates damaged housing or shifting of shield. Unit must be returned to manufacturer for repair.
- e. If source is removed from unit, and equipment design allows, examine internals of source tube with boroscope. Any worn through or fractured source tubes or evidence of lack of concentricity will require return of unit to manufacturer for repair.
- f. If source has been removed from unit, examine locking mechanism for proper operation. If source has not been removed this test will have to be conducted during final inspection phase.
- g. Pour about 2 ozs of solvent through the source tube from cable connector end. If source is still in unit this will require use of syringe with hypodermic needle attached. Drain and repeat until clean. Dry with low pressure air.
- h. Spray locking mechanism with WD-40 cleaner lubricant.
- i. If source is contained in unit replace shipping plug.

6. Final Inspection

- a. Reassemble system, connect control cables and guide tubes in preparation for operation
- b. If source has been removed, install "dummy" source.
- c. For units where it was impossible to remove source, it is now necessary to have a Licensees authorized representative set up required restricted areas for the conduct of radiography in accordance with the terms and conditions of the NRC License and also to operate the equipment.
- d. Observe operation of equipment several times until confident of proper functioning. Take particular note of any source position indicators and make adjustments as necessary.
- e. For devices equipped with electrical indicators, measure voltages and check circuit continuity. If unit has flashing lights check to assure they are operable and flashing. Replace capacitors, batteries or bulbs as necessary. Replace any cables lacking continuity.
- f. Assure proper functioning of locking mechanisms. Clean and lubricate as necessary. Any uncorrectable locking mechanism malfunctions will require return of unit to manufacturer for repair.
- g. If dummy source was installed, remove from unit.
- h. Request licensees representative to return source from storage container to device if source was removed.
- i. Lock device and install all shipping plugs.
- j. Conduct radiation survey of device to assure requirements of 10 CFR, 34.21 are not exceeded.
- k. Have device returned to storage and secure restricted areas.

7. Records

- a. Records will be maintained of the results of all inspection and maintenance procedures.

8. Transfer of Sources To and From Source Changer/Shipping Containers.

a. During occasions of unusual circumstance it may be necessary for F.L. Clifford to transfer sources to and from source changer/shipping containers. These occasions would be such as emergency situations or, when for some reason, a Licensees authorized representative is not on site or otherwise available. This condition would most probably occur for Licensees with small staffs of qualified personnel. Only the source changer/shipping containers listed herein will be utilized. Additionally, only the source changer/shipping containers that are compatible and authorized for any particular model of exposure device will be utilized with that device.

b. General Instructions During All Source Exchanges:

- (1) Be certain to have an operable and calibrated survey meter on hand. Meter must meet the requirements of 10 CFR, 34.21.
- (2) If exchange is to be conducted outside of a Licensees shielded exposure facility, radiation restricted areas must be established. Based on source strength, calculate distance to 2 mr/hr isodose line. Post with signs bearing the radiation caution symbol and the words "Caution-Radiation Area". Calculate distance to 100 mr/hr isodose line. Post with signs bearing the radiation caution symbol and the words "Caution-High Radiation Area".
- (3) At the completion of source exchanges, radiation surveys must be conducted of the devices to assure that the requirements of 10 CFR, 34.21 are not exceeded.

c. Operating Instructions for Automation Industries Model 500-SU Source Changer and Gamma Industries Model C-10 Shipping Container.

- (1) Locate source changer within 2 feet of exposure device.
- (2) Remove shipping plug from exposure device.
- (3) Unlock source changer, remove plug and connect short source tube, supplied by manufacturer, to both changer and exposure device.
- (4) Connect control unit to exposure device and extend to full length. (Detachable units only need be connected)
- (5) Unlock exposure device and transfer source into changer.
- (6) Conduct radiation survey as required by these procedures.
- (7) Detach drive cable from source pigtail and lock changer.
- (8) Repeat radiation survey of devices.
- (9) When sources are transferred from source changer to exposure device, these procedures are conducted in reverse order.

d. Operating Instructions for Technical Operations Model 414
and 650 Source Changers.

- (1) Locate source changer within 6 feet of exposure device.
- (2) Remove shipping plug from exposure device.
- (3) Remove cover and source hold down plate from changer.
- (4) Connect source tube to exposure device and changer.
- (5) Close and latch source guide tubes on changer.
- (6) Connect control unit to exposure device and extend to full length. (Detachable units only need be connected)
- (7) Unlock exposure device and transfer source to changer.
- (8) Conduct radiation surveys as required by these procedures.
- (9) Detach drive cable from source pigtail and replace source hold down plate and cover on changer.
- (10) Repeat radiation surveys of devices.
- (11) When sources are transferred from changer to exposure device these procedures are conducted in reverse order.