

CTL ENGINEERING INC. CONSULTING ENGINEERS TESTING · INSPECTION LABORATORY SERVICES EERING 2860 Fisher Road . Columbus, Ohio 43204 . 614-276-8123

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Gary R. Cattel, P.E. Vice President

L. Gregory DuBois, P.E. Vice President

March 7, 1985

U.S. NRC, Region III Materials Licensing Section 799 Roosevelt Road Glen Ellyn, Illinois 60137

Attention: Mr. John Madera

Reference: License No. 34-08331-01; Control No. 17230

Dear Mr. Madera:

Please find enclosed material you requested per your telephone conversation. The answer to your specific questions are as follows:

- (1) 30-Day Training - We wrote an explanation of our posture during our last license amendment renewal request which was accepted at that time.
- (2)The updated plan for CTL (Radiography) is basically unchanged except for the addition of the Visual and Audio Warning Devices. Additional sketches and data are enclosed.
- (3) In-House use of RT is included in our Standard Operating and Emergency Procedure (S.O.E.P.).
- (4) Visible-Audio Alarm System is included in our S.O.E.P. and the 313R Item 6 information enclosed.
- (5) A copy of our QA Program Approval is enclosed.
- (6) Handling/Using Sealed Sources is included in our S.O.E.P.
- (7) Excerpts from Mfg. Procedures is included in our S.O.E.P.
- (8) Transportation Procedures are included in our S.O.E.P.
- Maintenance Records are included in our S.O.E.P. SandEIVED (9)CTL Form 10-6, enclosed. MAR 1 2 1985

(10)Leak Testing Procedures are as enclosed in our S.O.E.P. PEGION III and 313R - Item 6 data. 8505140532 850424 REG3 LIC30

Membership Participation:

_____AALA__AAPT__ACI__ACIL_ACS__AGC__ANSI__APA__ASCE__ASM__ASME__ASTM__AWS CSI GSA ICBO ICET NSPE OACE ORMCA OCA SAE UFCA

34-0833-01

PDR

Formerly Columbus Testing Laboratory, Inc., Since 1927

MAR 1 2 1985

U.S. NRC, Region III Glen Ellyn, Illinois 60137 March 7, 1985 Page Two

(11) Form 313-R Item 6 - attachments are enclosed.

We apologize for not acting immediately to your request. We are eager to continue our RT program.

CTL has a total of two (2) radiographic personnel and has not added any personnel since 1978. However, we make a strong effort to keep current with 10CFR requirements and protect our record of never having had a serious violation.

We appreciate your assistance with our license renewal, and would be interested in any suggestions you may have to make our program simpler or more effective.

Please call collect if you need any additional information.

Respectfully submitted,

CTL ENGINEERING, INC.

James L. Crowley Radiation Safety Officer

JLC:nh Enclosures



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CTL ENGINEERING, INC. RADIOGRAPHY TRAINING PROGRAM MARCH 1, 1985. PAGE 1

DETAILED OUTLINE-INITIAL TRAINING

MAJOR AREA OF INSTRUCTION		TIME/RA TRAINEE	TIME/RADIOGRAPHER TRAINEE
1.	Radiation Physics	3 hours	1 hour
i.	 a. Atomic structure b. Radioactivity, the c c. Kinds of radiation d. Interaction of radia e. Ionization, the roem f. Attenuation and abso g. Reduction factors, H h. Iridium 192, Cobalt i. Principles of safety j. Detection and measur 	tion with matter tgen rption VL and TVL layers 60 dose rates ement	T
ι.	Reading assignment: Manual OE-84036; Chapter:	s 1-5	
2.	Biological Effects of Ra	diation hour	1/2 hour
ı. ı.	 a. Internal, external has b. Units of measure c. Levels and symptoms of d. Effects of radiation e. Somatic and genetic of f. Case Histories Reading assignment: Manual OE-84036; Chapters 	azards of injury damage 5 6-7	
3.	S.E.O.P. Sections 0 and 1	1 hour	1 hour
1.	 a. Scope b. IOCFR19 c. IOCFR20 d. IOCFR34 e. Conditions of license f. Organization and duti 	es and responsibilities	
	Reading assignment: a. S.O.E.P. Sections 0 a b. IOCFR19, 20 and 34	nd I	

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CTL ENGINEERING, INC. RADIOGRAPHY TRAINING PROGRAM

MARCH 1, 1985 PAGE 2

TIME/RADIOGRAPHER

TRAINEE

3 hours

AILE	D OUTLINE-INITIAL TRAINING	
OR A	REA OF	TIME/RA TRAINEE
s.c	.E.F. Section 2 IOCFR 20	
and	1 34	5 hours
а.	Exposure devices and stor	age containers
b.	Sequence of operation - CI	TL and field
с.	Operating instructions fo	r devices
d.	Emergency situations	
	OR A TRUC S.C and a. b. c. d.	AILED OUTLINE-INITIAL TRAINING OR AREA OF <u>TRUCTION</u> <u>S.O.E.F. Section 2 IOCFR 20</u> <u>and 34</u> a. Exposure devices and stor b. Sequence of operation - CL c. Operating instructions fo d. Emergency situations

- e. Source receipt and changes
- f. Leakage test and radiation levels for devices
- g. Records
- 11. Reading assignment:
 - a. IOCFR20.1-20.105; 20.205-20.207, 20.401-20.405
 - b. IOCFR34.1-34.2, 34.21-34.28
 - c. S.O.E.P. Section 2
- 5. S.O.E.P. Section 3,4,5, IOCFR 20 and 34 4 hours

2 hours

i. a. Posting and restricting radiographic areas b. Dose rates and methods of controlling dose

- c. Working time
- d. Distance and inverse square law-Table I
- e. Shielding, Table II and collimators
- f. Surveys
- g. Personnel Monitoring
- h. Monitoring instruments
- i. Records

ii. Reading assignment:

- a. IOCFR19.1-19.16
- b. 10CFR20.201-20.240, 20.407-20.409
- c. IOCFR 34.41-34.43
- d. S.O.E.P. Section 3,4,5
- 6. S.O.E.P. Sections 6,7,8 IOCFR 20 2 hours and 34

I hour

- i. a. Locking and security of sealed sources b. Marking and labeling
 - c. Storage and temporary storage areas
 - d. Transporting sources-B/L and placarding
 - e. Routine maintenance
 - f. Daily-use/inspections
 - q. Records
- ii. Reading assignment:
 - a. IOCFR 20.203
 - b. IOCFR 34.21-34.23,34.41-43
 - c. S.O.E.P. Section 6.7.8

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CTL ENGINEERING, INC. RADIOGRAPHY TRAINING PROGRAM

MARCH 1, 1985 PAGE 3

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INS	STRUCTION	TIME/RA TRAINEE	TIME/RADIOGRAPHE
7.	S.O.E.P. Sections 9, 10 CFR 20		THUTTLE
	and 34	2 hours	1 hour
1.	 a. Damage to devices b. Vehicle accident c. Emergency situation at jobsi d. Loss of sealed source e. Excessive exposure to person f. Notification of incidents g. Records h. Forms 10.1-10.5 	te nel	
i.	Reading assignment: a. IOCFR20.401-20.407 b. IOCFR34.26-34.31 c. S.O.E.P. Sections 9,10		
3.	Review of Training IOCFR 19,20 an	d 34 4 hours	2 hours
l J k I m	 b. Characteristics of radiation c. Units of radiation dose and q d. Hazards of excessive exposure e. Levels of radiation from mate f. Methods of controlling radiat Working time Working distances - table Shielding - table II g. Radiation detection instrument t. Operation Limitations Survey techniques Use of personnel monitoring eq Film badges Pocket dosimeters Radiographic equipment to be u Radiographic exposure devi Storage containers and cha The requirements of pertinent 	uantity of radio of radiation au rial ion dose I and calculatio tation to be use uments guipment sed ces ngers Federal Regulation cy Procedures	oactivity nd Case Histories ons ed
Rabc	eading assignment: . IOCFR 34- Appendix A . S.O.E.P. Sections 2 thru IO-rev . Manual OE-84036-Brief review page	view	

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CIL ENGINEERING, INC. RADIOGRAPHY TRAINING PROGRAM

MARCH 1, 1985

DETAILED OUTLINE-INITIAL TRAINING

MAJOR AREA OF		TIME/RA TRAINEE	TIME/RADIOGRAPHER TRAINEE
9.	Laboratory Exercises an	d Simulations 2 hours	1 hour
۱.	 a. Set up and posting b. Set up, inspect, si radiographical oper c. Survey of boundarie 	controlled areas mulate and secure ation s. devices and "check-source	511

- d. Perform calculations for dose rates
- e. Simulations for set up of Iridium changer, 498, 533, 402 and P-60-100 units
- f. "Walk-thru" (simulation) of Sections 2 thru 6

ii. Assignment: Complete sample forms 10.1 thru 10.5

NOTES FOR TRAINING PROGRAM:

- 1. Times listed are minimum. Actual time spent on each major area of instruction will be based on individual needs of trainees.
- 2. Reading assignments are in addition to classroom instruction. Time for reading assignments are not listed herein, and will be left to trainee. Oral quizzes on reading assignments may indicate additional study is required for individual trainees.

3. Required training Aids:

- a. USAEC Manual OE-84036-3-68
- b. USAEC Guide OE-84035-3-68
- c. USAEC Guide OE-84034-3-68
- d. IOCFR19,20,21,34
- e. USNRC License No. 34-08331-01
- f. CTL Engineering, Inc. S.O.E.P. Manual
- g. NUREG BR-0001; BR-0024

A. NARRATIVE DESCRIPTION

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Personnel are selected for radiography on the basis of their general education and personal attributes (attitude, physical condition, ability to follow instructions, etc.).

Each person selected, irrespective of previous experience or training is regarded as a trainee who must qualify as a radiographer's assistant, except that the classroom instruction and on the job training time schedules may be modified as detailed under D, below.

Instruction by an outside agency is not used in our training program to satisfy the requirements of IOCFR34.

Each trainee receives training as a radiographer's assistant. Training is as detailed as per enclosed schedule.

Upon satisfactory completion of training and examination as a radiographer's assistant (R.A.) the R.A. works with a qualified radiographer for one (1) calendar month (30 days) as a part of on-the-job training, See C, below.

B. INITIAL ("CLASSROOM") TRAINING

Each trainee receives classroom instruction for an R.A. as per enclosed schedule.

Upon satisfactory completion, the trainee receives on-the-job training for 30 days and then receives an additional ten hours training to qualify as a radiographer.

The instruction given during the ten hours covers the requirements of IOCFR34 Appendix A, as detailed in the enclosed schedule for R.A. training <u>except</u> that the time for each minor area is apportioned on the basis of individual need.

- NOTE I Instruction is on a one to three man: one instructor ratio. Time for training on each minor area is based on the examination for R.A. and on-the-job training observations for each individual trainee.
- NOTE 2 Our program for R.A. training also covers the requirements of IOCFR34 Appendix A.

C. ON-THE-JOB TRAINING

Qualified R.A.'s receive one month (30 calendar days) training on-the-job working with an experienced and qualified radiographer.

A minimum of 20 radiographic assignments, with each phase reviewed during actual operation by the radiographer, is required within the 30 day period. (if 20 assignments are not covered, additional days are required beyond the 30 specified).

The R.S.O. review the R.A. at least once each week, or not less than five times during the on-the-job training period. Satisfactory completion and examination qualifies trainee as a radiographer.

D. TRAINING OF RADIOGRAPHERS AND R.A. 'S WITH PREVIOUS EXPERIENCE

Trainees with previous experience as a radiographer receive the same instruction as previously submitted for the R.A., except that the time schedule is as follows:

- 1. Radiation Physics 1/2 hour
- 2. Biological Effects of Radiation 1/2 hour
- 3. Standard Operating and Emergency Procedures (S.O.E.P.) Sections
- 4. S.O.E.P. Section 2 and applicable sections of IOCFR20 and 34 4 hours 5. S.O.E.P. Sections 3,4,5 and applicable sections of IOCFR20 and 34 -
- 6. S.O.E.P. Sections 6,7,8 and applicable sections of CFR10-20 and 34-
- 7. S.O.E.P. Sections 9,10 and applicable sections of IOCFR20 and34 I hour
- 9. Laboratory exercise 1/2 hour

On-the-job training is reduced to one (1) week with review by the R.S.O. at

Examination requirements are the same as for other radiographer trainees.

Trainees with previous experience as an R.A. are required to receive the same training and examination as unexperienced R.A. trainees.

E. PERIODIC REFRESHER TRAINING

Meetings are scheduled twice a month whenever practicable, but not less than once a month. Meetings last one (1) to two (2) hours.

During the meetings, completed records are reviewed. Procedures concerning equipment inspection, maintenance, storage and use of exposure devices, meters, posting and surveys, regulations and safe operating practices are reviewed

F. TESTING PROCEDURES

Tests are altered periodically. Because the written examination questions primarily require essay type answers, the minimum frequency of altering such tests is one (1) year or two (2) applications of the examination questions

-2-

NOTE 1 - The same questions used in this exam that are answered wrong or partially incomplete are used for radiographers after the period of on-the-job training.

Oral examinations are altered for each examination.

Practical examinations cover surveys, handling and use of exposure devices, posting and restricting areas, S.O.E.P. practices, monitoring and records.

Testing is by observing, extemporaneous oral questions (eg; "How can you tell that survey meter is operating OK?" "Why did you post the radiation sign at that spot?", etc.), during simulations for R.A.'s and on-the-job training for radiographer trainees. Periodic review on-the-job at least once a month by the R.S.O. is also used as a means of testing proficiency of radiographers. (See copy of a practical exam, enclosed).

In each case, IOCFR and the Company Standard Operating and Emergency Procedures are used by the R.S.O. to evaluate personnel qualifications. The criteria and procedures used in evaluating test results are as follows:

Examination criteria: correctness and completeness of answers, based on IOCFR and S.O.E.P. requirements. 80 percent correct (4 out of 5) answers are required.

Procedure: Review answers to written and oral questions on the basis of IOCFR and S.O.E.P. Review practical operations for simulations during R.A. training; and on-the-job training for radiographer trainees and radiographers.

Unsatisfactory answers are discussed and similar questions asked orally after sufficient review and study time.

Written exams are given upon completion of initial training.

Oral and practical exams are given at the close of on-the-job training.

NOTE 1 - oral and practical exams are also given during refresher training and on-the-job review of radiographers, by the R.S.O.

G. INSTRUCTOR'S QUALIFICATIONS

Instruction is given by the R.S.O., James Crowley, who has 25 years experience as radiographer and instructor.

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H. RECORDS

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A record of written examinations given to each trainee and brief description of oral and practical tests will be maintained, along with an overall evaluation of trainees.

Name	Date
Examiner	Grade

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1. The second second

ISOTOPE RADIOGRAPHY EXAMINATION

USNRC BYPRODUCT MATERIAL LICENSE NO. 34-08331-01

This is a closed-book examination. Answer each question briefly but completely.

Time limit is 90 minutes. Sign each page.

CTL ENGINEERING, INC. 2860 Fisher Road Columbus, Ohio 43204

I. Fundamentals

- A. Characteristics of Gamma Radiation
 - 1. The term Mev. stands for
 - Is it true that all radioactive materials emit gamma rays?
 - The basic difference between gamma rays and X-rays is
 - 4. What is meant by half-life and what is the half-life for <u>60</u>cobalt? For 192 Iridium?
 - 5. What are the three processes by which gamma rays produce ionization?
 - a. ______ b. ______ c.

B. Units of Radiation Dose and Radioactivity

1. What is a roentgen?

- 2. What is a Rem?
- 3. What is the relationship on the following units Roentgen, Rem, Rad. for X and gamma radiation?
- 4. What is a Curie?
- 5. What is meant by specific activity?
- C. Hazards of Excessive Exposure
 - 1. What is meant by Somatic effects?
 - 2. What is meant by Genetic effects?
 - White blood cells are quite ______ to radiation.
 - 4. Muscle and nerve cells are quite ______ to radiation.

- C. (con't)
 - 5. What would be the probable effects if you received the following dosages of radiation?
 - a. 25 Rems

 b. 100 Rems

 c. 300 Rems
- D. Levels of Radiation from Licensed Material
 - 1. Complete the following:

d. 600 Rems

- A radiation area is any area in which a person continually present may receive a dose in excess of MR in any one hour.
- b. A high radiation area is any area in which a person continually present may receive a dose in excess of ______MR in any one hour.
- 2. State and explain the formula used to determine the maximum permissable dose.
- 533 Units shall have no radiation level in excess of MR/hr at 6" from any exterior surface.
- 498, 402A, P60-100-2 Units shall have no radiation level in excess of MR/hr at the surface.
- 5. How is the "Transport Index" determined for use with the yellow 111 label?
- E. Methods for Controlling Radiation Dose
 - 1. State and explain the Inverse-Square Law.
 - 2. What is the dose rate for the following?

192 Iridium

60 Cobalt

3. What is the half-value layer in the following materials for 192 Ir. and 60 Co.?

н	Concrete/192 Ir;	 Concrete/60	co.
	Steel/192 Ir;	 Steel/60 Co.	

" Lead/192 Ir; " Lead/60 Co.

		Hame
Е.	(cc	on't)
	4.	Radiation exposure dosage is
	5.	In addition to calculations, the following may be used to establish first exposure perimeter boundaries:
		a
		b.
Rad	iati	on Detection Equipment
A.	Sur	vev Instruments
	1.	Briefly explain how you operate the 592B Survey Meter:
	2.	Briefly explain how you operate the 510G Survey Meter:
	2	How often should survey meters be calibrated?
	1	What are the ranges for the following:
	4.	Flog
		<u>592B</u> <u>510G</u> <u>POCKEL DOSMECEL</u>
		MR/nrMR
		MR/hrMR/hr
		MD /hr
в.	Sur	vey Techniques
в.	Sur 1.	vey Techniques List four examples of when surveys should be performed.
в.	Sur 1.	vey Techniques List four examples of when surveys should be performed.
в.	Sur 1.	MR/HIMR/HI vey Techniques List four examples of when surveys should be performed. a b
в.	Sur 1.	<pre>MR/H vey Techniques List four examples of when surveys should be performed. a</pre>

II. (con't)

- C. Personnel Monitoring
 - What personnel monitoring is required whenever radiography is performed?
 - Briefly explain the operation and use of the personnel monitoring listed in the previous answer.

III. Radiographic Equipment

1. List the radiographic equipment and the capacity for each unit listed under our license.

Unit Model No.	Source	Max. No. of Curies

- How often should radiographic exposure devices be inspected?
- 3. How often should preventative maintenance be performed?
- 4. How often should source leak tests be performed and what is considered an acceptable rate for our source?
- 5. What storage precautions should be taken for exposure devices and storage of containers?

- IV. Federal Regulations
 - What parts of 10 CFR are you required to have in your possession whenever you are performing radiography in the field?
 - 2. What other documents should you have, also?
 - 3. 10 CFR 20 pertains to _____

V. S.O.E.P.

- 1. What does S.O.E.P. Section 2 pertain to?
- 2. What does S.O.E.P. Section 3 pertain to?

3. What does S.O.E.P. Section 4 pertain to?

- 4. What does S.O.E.P. Section 5 pertain to?
- 5. What does S.O.E.P. Section 6 pertain to?
- 6. What does S.O.E.P. Section 7 pertain to?
- 7. What does S.O.E.P. Section 8 pertain to?
- 8. What does S.O.E.P. Section 9 pertain to?

V. (con't)

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9. What forms are you required to use under S.O.E.P. Section 10?

CTL ENGINE®RING, INC. 2860 Fisher Road Columbus, Ohio 43204

ISOTOPE RADIOGRAPHY EXAMINATION USNRC LICENSE NO. 34-08331-01

TEST KEY

I.	Α.	1.	Million electron volts (energy or radiation)
		3.	Their origin. Gamma from disintegration of auto- matic nuclei, X from electrical apparatus (X-ray machine).
		4.	Half life is the time necessary for radioactive decay to 50% of original. 60 Co = 5.3 years, 192 Ir = 74 days.
		5.	a. Photoelectric effect (absorption)b. Compton effect (scattering)c. Pair production
	в.	1.	Unit of measure for ionizing radiation, in air.
		۷.	Unit of measure for effect of ionizing radiation in man (roentgen equivalent man)
		3.	1 Roentgen = 1 Rem = 1 rad.
		4.	Unit of measure for radioactivity (37 billon disintegrations of atomic nuclei per second.
		э.	Curies per gram of material.
	с.	1.	Biological effects of radiation to the person exposed.
		2.	Biological effects of radiation to genetic material, which may appear in later generations.
		3.	Sensitive
		4.	Resistant
		5.	a. No detectable effects
			 b. Temporary blood changes, no serious injury c. Serious injury, permanent damage d. Death
	υ.	1.	a. Two (2) b. 100
		2.	5 (N-18) where N = a person's age in years maximum dose is in rems.
		3.	50
		4.	200
		5.	MR/HR at 3 feet (highest measured dose rate in milliroentgens/hour at 3 feet from the container surface).

Б.

1. $\frac{I}{IO} = \left(\frac{DO}{D}\right)^2$ where I = Radiation at Distance D IO= Initial radiation at distance DO DO= Initial distance from source D= Distance at which intensity is I

(Radiation varies inversely as the square of the distance)

- 2. 192 Ir = 5.9 roentgens/hour/curie at 1 foot 60 Co = 14.4 roentgens/hour/curie at 1 foot
- 3. 1.9 (2") concrete/192 Ir; 2.7 (2-3/4") concrete/60 Co. 0.61 (5/8") steel/192 Ir; 0.87 (7/8") steel/60 Co. 0.19 (3/16") lead/192 Ir; 0.49 (1/2") lead/60 Co.
- 4. Directly proportional
- S.O.E.P. table 1, previous survey data for same conditions

II. A.

- Turn meter on to zero position, adjust knob until needle rests at zero, select proper scale X1, X10, X100 as appropriate (set meter prior to entering radiation area)
- Turn meter on to X100 scale, pres batt button, assure needle reads in green area on dial, select proper scale x1, X10, X100 as appropriate (set meter prior to entering radiation area)
- At three month intervals, or sooner if required ((repairs, suspected damage)
- 4. 0-10/592B; 0-10/510G; 0-200/dosimeter 10-100/592B; 10-100/510G 100-1000/592B; 100-1000/510G
- B. l. a. When removing a unit from storage
 - b. Loading-unloading into vehicle
 - c. After each exposure
 - d. Final survey at storage
 - e. When damage to unit occurs
 - f. When establishing perimeter boundaries
 - g. Abnormal conditions (high dosimeter readings, etc.)
- C. 1. Pocket dosimeter and film badge (minimum)
 - Pocket dosimeter is set to zero on charger, worn and viewed during operations to monitor dosage. Recharge if the film badge is worn during operations and submitted to supplier for processing and reporting at required intervals.

- 2 -

I. 1.	Unit	Source	Curies
	498(b)	192Ir.	50
	533	192 Ir.	100
	402(a)	60 Co.	20
	P-60(100)	60 Co.	100 (+100 Ci 192 Ir.)
	Ml (CTL)	192 Ir.	100 (+100)

Daily (plus whenever malfunction is suspected)

- 3. Quarterly (or sooner as required)
- 4. At six month intervals. Less than 0.005 microcuries
 5. Units should be locked, secured against tampering or removal and the storage area posted, as required

IV. 1. 19, 20, 21, 34

II

2. S.O.E.P. License (forms CTL 10.1-10.4, AEC-3)

3. Standards for protection against radiation.

V. 1. Handling and use of sealed sources and radiographic exposure devices

- 2. Radiation surveys
- 3. Personnel monitoring
- 4. Controlling access to radiogaphic (RT) areas
- 5. Locking and storage precautions
- 6. Transporting sealed sources
- Inspection and maintenance of RT devices and storage containers

o. Instructions for emergency situations

- 9. a. Inspection check list (form 10.1)
 - tb. Radiographer's utilization record (form 10.2)
 - tc. Radiographic survey record (form 10.3)
 - ta. Personnel dosimeter record (form 10.4)
 - e. Emergency notification form (form 10.5)

tForm 10.3A includes data for 10.2, 10.3, 10.4 and is an acceptable answer when referenced for survey, utilization and dosimeter use.

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CTL ENGINEERING, INC.

INTERNAL AUDIT AND INSPECTION SYSTEM REPORT

NOTICE:

An Internal Audit shall be performed at intervals of not more than three (3) months to insure that license provisions, regulations, and Standard Operating and Emergency Procedures are followed by all radiographers and radiographers assistants. Any deviation shall result in an immediate work stop-order until such deviation has been rectified. All work-stop ordersshall require a written report to be attached to this form. Final disposition shall be noted and report signed by the Radiation Safety Officer.

The internal inspection system used to assure that Procedures are followed by radiographic personnel is principally regular personal observation by the Chief Radiographer and the Safety Officer. It is the direct duty of the Chief Radiographer to supervise all other radiographers and radiographers' assistants. The Chief Radiographer will maintain all necessary records and review requirements for compliance of proper procedures. The Safety Officer, through personal observation and review of records and procedures will assure that all functions of the Chief Radiographer are properly executed.

REMARKS:

QUARTERLY RECORDS COMPLETED AND ATTACHED

Inventory and Inspectio	on Records - Sources & Equipment	
Visible and Audible Ala	rm Systems/ RT Rooms	
Form AEC 5 & FILm Badge	/Dosimeter Review	
Safety Meeting Record/A	genda & Attendance	
Notation/Required RSO B	Review of ALI Records	
Signature	Date	

Radiation Safety Officer

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CTL ENGINEERING, INC.

QUARTERLY INSPECTION RECORD

All radiographic exposure and storage devices shall be inspected in accordance with Section 8.1 of the Standard Operating and Emergency Procedures. Each device shall be listed on this form with information on inspection, condition, maintenance and repair completed. Completed Inspection Check List forms shall be attached and made a part of this record. All records shall be maintained on				
file, as required.				
Device	s/N	Conditio	n	
Repairs Required				
Preventative Maintenance Re	cord			
Device Now Serviceable, Cle	aned and Labeled?	Ву	Date	
Device	S/N	Conditio	n	
Repairs Required				
Preventative Maintenance Re	cord			
Device Now Serviceable, Cle	aned and Labeled?	Ву	Date	
Device	S/N	Condition		
Repairs Required				
Preventative Maintenance Red	cord			
Device Now Serviceable, Clea	aned and Labeled?	Ву	Date	
REMARKS:				
			1	

Attachment to Form 313R (previously submitted)

- 6 (a) Attached, as per (6-e)

(For checking leak test kit before mailing, only.)

(c) Instruments to be calibrated by:

Gamma Industries, Inc. 2255 Ted Dunham Avenue Baton Rouge, La.

Victoreen Instrument Co. 10101 Woodland Avenue Cleveland. Ohio

Eberline Instrument Co. P.O. Box 2108 Santa Fe, New Mexico 87501

Battelle Memorial Institute 505 King Avenue Columbus, Ohio 43201

or CTL Engineering, as per S.O.E.P., attached/(6-3)

(d) Film badges for X and Gamma on a monthly exchange rate, from:

> Siemens Gammasonics, Inc. P.O. Box 1367 Des Plaines, Ill.

> R. S. Landauer, Jr. & Co. 2 Science Road Glenwood, Ill.

Dosimeters, 0-200 MR Range:

Victoreen Inst. Co.. 541 Model Bendix Corp. - Equivalent to 541 Dosimeter Corp. of America, 862 Model

Note: We are presently using one (1) Dosimeter of unknown manufacture which appears to be comparable to the above and meets all other criteria.

- (e) SOEP, as attached
- (f) Attached
- (q) As per (6-e) and CTL Form 10-9, attached
- (h) As per (6-e) attached
- (i) As per (6-e) attached. Kit suppliers are:

ICN Health Physics Service - Kit No. LT-1 Suntral Services, Inc. - Kit No. SIT-1

Also, manufacturers who supply sources and issue certs are acceptable for supply and disposal leak tests.



Form 313R - Attachment 6A

The roof has no means of access. An extension ladder must be obtained and placed alongside the building should it be necessary to get onto the roof. The roof construction is primarily sheet metal and will not support heavy shielding. The roof has metal standards and is barricaded and posted at the 2MR/HR perimeter. Also, a concave mirror has been affixed outside the building, which may be viewed through a window in the door northwest of the RT Room.

Wall of the RT Room are 24" solid concrete on all four (4) sides. The single door to the RT Room is lead-lined and has a 12" solid concrete back-up wall directly opposite.

The floor is on grade, with no basement or second story.

Areas on outside of the building are for Radiography Dept. parking and storage, with temporary barricades and posting erected as necessary during radiography to restrict area to 2 MR/HR if needed.



RADIOGRAPHY AND STORAGE FACILITY

RADIATION SURVEY

CTL ENGINEERING, INC. 2860 FISHER ROAD Columbus, ohio 43204

General:

A Radiation Survey was conducted to define limits of controlled area boundaries. The following conditions should be noted: 1) The source did not have a radiographic specimen interposed between the collimator and shielding wall, as in the case of actual radiography. 2) The maximum readings observed are recorded. 3) Independent surveys were made with the source, in our "Medium" collimator directed at the floor, east, south and west walls, respectively.

Independent surveys were conducted using a 60 Co. source of 58 Ci nominal strength. A 6" lead filled collimator of Columbus X-Ray Company design, with a 60° beam spread was used for directing the unobstructed beam towards the walls and floor. (Normally, this source would be used for steel specimens greater than two (2) inches thick, which would offer added shielding.

The areas indicating 20 Mr./Hr. on the sketch are controlled by means of standards and signs whenever it is necessary to direct the source in that direction. Also, by limiting exposure times, proper collimation, temporary shielding, etc., we can meet all necessary requirements to limit exposure to unmonitored persons.

The roof area above the radiation room has been surveyed with the source in each attitude indicated above. All standards have been moved to the 2 Mr./Hr. perimeter.





