

MATERIALS LICENSE

Amendment No. 06

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 36, 39, 40, and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations, and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

302071

Licensee		In accordance with letter dated November 22, 1996	
1. Carondelet Foundry Company d/b/a The Carondelet Corporation		3. License Number 24-26136-01 is amended in its entirety to read as follows:	
2. 8600 Commercial Boulevard Pevely, MO 63070-1528		4. Expiration Date October 31, 2001	
		5. Docket or Reference No. 030-31524	
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	
A. Iridium-192	A. Sealed sources (Amersham Model No. A-424-9 or No. A-424-19)	A. 3 sources not to exceed 100 curies per source	
B. Cobalt-60	B. Sealed sources (Amersham Model No. A-453-2)	B. 2 sources not to exceed 22 curies each	
C. Cobalt-60	C. Sealed source (Amersham Model No. A424-14)	C. One source not to exceed 50 curies	
D. Uranium depleted in Uranium-235	D. Solid metal	D. 999 kilograms total	

9. Authorized Use:

- A. For use in Amersham Model 660A and 660B exposure devices for industrial radiography and Amersham Model 650L source changers for storage and replacement of sources.
- B. For storage only in an Amersham Model Iriditron 520 exposure device.
- C. For use in Amersham Model 680B exposure device for industrial radiography.
- D. For shielding in radiographic exposure devices and source changers.

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MATERIALS LICENSE
SUPPLEMENTARY SHEET

License Number

24-26136-01

Docket or Reference Number

030-31524

Amendment No. 06

CONDITIONS

10. Licensed material may be used only at the licensee's facilities located at 8600 Commercial Blvd., (Lot 2, I-55 Business Park), Pevely, Missouri.
11. The Radiation Safety Officer for this license is Daren LaRose.
12. Licensed material shall only be used by, or under the supervision and in the physical presence of, individuals who have received the training described in letter dated October 16, 1996 (with attachments) and have been approved in writing by the Radiation Safety Officer.
13.
 - A. Notwithstanding the periodic leak test required by 10 CFR 34.25(b), the requirement does not apply to radiography sources that are stored and not being used. The sources exempted from this test shall be tested for leakage before use or transfer to another person. No sealed source shall be stored for a period of more than 10 years without being tested for leakage and/or contamination.
 - B. Sealed sources authorized for a use other than radiography shall be tested for leakage in accordance with 10 CFR 34.25.
14. The licensee is authorized to receive, possess, and use sealed sources of iridium-192 or cobalt-60 where the radioactivity exceeds the maximum amount of radioactivity specified in this license provided:
 - A. Such possession does not exceed the quantity per source specified in Item 8 by more than 20 percent for iridium-192 or 10 percent for cobalt-60; and
 - B. Records of the licensee show that no more than the maximum amount of radioactivity per source specified in this license was ordered from the supplier or transferor of the byproduct material; and
 - C. The levels of radiation for radiographic exposure devices and storage containers do not exceed those specified in 10 CFR 34.21.
15. Sealed sources or detector cells containing licensed material shall not be opened or sources removed from source holders by the licensee.
16. The licensee is authorized to transport licensed material only in accordance with the provisions of 10 CFR Part 71, "Packaging and Transportation of Radioactive Material."
17. The licensee shall maintain records of information related to decommissioning at the location listed in Condition 10 of this license as specified in 10 CFR 30.35(g) until this license is terminated by the Commission.

COPY

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18. The licensee shall arrange for properly trained representatives of the manufacturer or other authorized entity to safely recover a disconnected source.
19. Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents including any enclosures, listed below. The Nuclear Regulatory Commission's regulations shall govern unless the statements, representations and procedures in the licensee's application and correspondence are more restrictive than the regulations.
 - A. Letters dated September 6, 1996 and October 16, 1996 (with attachments).

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Date

11/27/96

By

James Mullowney
Nuclear Materials Licensing Branch, Region III

COPY

BETWEEN:

License Fee Management Branch, ARM
and
Regional Licensing Sections

(FOR LFMS USE)
INFORMATION FROM LTS

Program Code: 03310
Status Code: 0
Fee Category: 30 2B
Exp. Date: 20011031
Fee Comments:
Decom Fin Assur Req'd: N

LICENSE FEE TRANSMITTAL

A. REGION

1. APPLICATION ATTACHED

Applicant/Licensee: CARONDELET FOUNDRY COMPANY
Received Date: 961125
Docket No: 3031524
Control No.: 302071
License No.: 24-26136-01
Action Type: Amendment

2. FEE ATTACHED

Amount: \$690
Check No.: 20200

3. COMMENTS

Signed
Date

Marcus [Signature]
11/26/96

B. LICENSE FEE MANAGEMENT BRANCH (Check when milestone 03 is entered / /)

1. Fee Category and Amount: (30) 2B \$720

2. Correct Fee Paid. Application may be processed for:

Amendment ☒
Renewal ☐
License ☐

3. OTHER

Signed
Date

SC
12/5/96

DEC 09 1996

Log *Dec 1 III*
Remitter *20200* *20203*
Check No. *20200* *20203*
Amount *\$690* *\$30*
Fee Category *30 2B*
Type of Fee *Amendment*
Date Check Rec'd *12/5/96*
Date Completed *12/5/96*
By: *SC*

1996 DEC -3 PM 1:43



THE CARONDELET CORPORATION

03031524

November 22, 1996

Mr. Robert Gattone, Jr.
Radiation Specialist
Nuclear Materials Licensing Branch
United State Nuclear Regulatory Commission Region III
801 Warrenville Road
Lisle, IL 60532-4351

Re: Change of Radiation Safety Officer for Material
License No. 24-26136-01

Dear Sir:

Robert Mark Spees listed under condition Eleven (11.) of our license number 24-26136-01 Amendment No. 05 as radiation safety officer has tendered his resignation effective December Sixth (6th) 1996. To fill this vacancy in our organization, Carondelet Corporation designates Daren LaRose to assume those responsibilities on December Seventh (7th) 1996.

Mr. LaRose has received all the required training listed in Part 34.31 "Personal Radiation Safety Requirements for Radiographers and Radiographer's Assistants", has passed the IRRSP examination in radioactive materials and has thorough knowledge of our emergency and operating procedures. He will assume all the responsibilities listed in Item 7.1 "Radiation Safety Officer's Duties" a revised copy is enclosed.

Included in this letter is the \$690.00 fee for a license amendment. Finally, in comparing your letter of November Fourth (4th) 1996 you have referred to our material license as "Amendment No. 4" yet on the material license it is listed as "Amendment No. 5". I am taking this discrepancy as a typo in your letter.

If you need further information or if I can be of any assistance in a timely resolution of this matter, do not hesitate to call me at (314)479-4499, ext. 236.

Regards,

THE CARONDELET CORPORATION

Richard Huber
Quality Assurance and
Radiation Safety Coordinator

RECEIVED

NOV 25 1996

REGION III

302071

NOV 25 1996

pm 11/25/96

ITEM 7 - INDIVIDUALS RESPONSIBLE FOR RADIATION SAFETY PROGRAM

- 7.1 Organization pertaining to the radiography program, name and title of each individual with responsibility for management or supervision of the program.

Mr. Rich Huber
Radiation Safety Coordinator
Quality Assurance Manager

Mr. DAREN LaROSE
Radiation Safety Officer
Radiographer

Mr. Ron Kelley
Radiographer

The Radiation Safety Coordinator (RSC) shall be appointed by the president of Carondelet Foundry Company and shall maintain overall active corporate control of the Radiation Safety Program. The RSC's duties are as follows:

- A. Serve as liaison officer to the NRC and other agencies on licensing matters.
- B. Direct and supervise the Radiation Safety Officer (RSO) with delegated duties in maintaining the Radiation Safety Program.
- C. Ensure that radiation safety inspections are conducted quarterly on all certified radiographers under this license.

The Radiation Safety Officer (RSO) shall implement and enforce the Radiation Safety Program. The RSO's duties are as follows:

- A. Maintain a personnel monitoring program.
- B. Enforce the use of radiation survey instruments at all radiographic operations.
- C. Conduct or supervise the training program for radiographers and assistant radiographers.
- D. Examine and determine competence of refresher examinations.
- E. Establish and maintain storage facilities.
- F. Maintain exposure devices, radiographic facilities and related equipment.
- G. Maintain the leak testing program.
- H. Maintain the internal inspection system.
- I. Direct source replacement operations.
- J. Maintain the record keeping system established by the operating procedures.
- K. Assume control and institute corrective action in emergency operations.

- L. Investigate the cause of accidents, determine the necessary preventive action(s), and report such occurrences promptly to the NRC.
- M. Submit to the NRC the documentation that is required by operating procedures.

7.2 Specific training and experience of individuals responsible for the day-to-day conduct of the program:

7.2.1. Dates of training in radiation and radiation safety, location, instructor

- A. Rich Huber, Daren LaRose and Ron Kelley have all successfully completed the following courses:
 - 1. "Radiation Safety Training for Radiographers," 40 hours, January 23 - 27, 1994 at Carondelet Foundry, Pevely, MO with Dr. Clarence E. Styron of R. W. Wester and Associates, Inc., St. Peters, MO
 - 2. "Radiography Radiation Safety Training," 8 hours, January 26, 1995 at Carondelet Foundry, Pevely, MO with Dr. Clarence E. Styron of R. W. Wester and Associates, Inc., St. Peters, MO
 - 3. "Radiation Safety Refresher," 6 hours, January 17, 1996 at Carondelet Foundry, Pevely, MO with Paul W. Sinn of Paul Sinn Testing Service
- B. Rich Huber, James Vaughn (Shipping Department) and Richard Vieter (Shipping Department) have all successfully completed the course "DOT Hazardous Materials Training for Radiographers," 4 hours, November 28, 1995 at Carondelet Foundry, Pevely, MO with Dr. Clarence E. Styron of R. W. Wester and Associates, Inc., St. Peters, MO.
- C. Daren LaRose and Ron Kelley have successfully completed 7.5 hours of classroom training on subjects prescribed in Carondelet Foundry Corporation's training outline for Assistant Radiographers (cf. Section 8.1.1 of this application).

NAME	Radiation Safety Training for Radiographers, 40 hours, 1/23-27/94	Radiography Radiation Safety Training, 8 hours, 1/26/95	DOT H/M Training for Radiographers, 4 hours, 11/28/95	Radiation Safety Refresher, 6 hours, 1/17/96
Rich Huber	✓	✓	✓	✓
Daren LaRose	✓	✓		✓
Ron Kelley	✓	✓		✓
James Vaughn (Shipping)			✓	
Richard Vieter (Shipping)			✓	

- 7.2.2. On-the-job training (dates, name and address of the firm, equipment used, date initially designated a radiographer)
- A. Daren LaRose, Radiographer, completed 520 hours on-the-job training at Carondelet Foundry Corporation on May 5, 1994 and was initially designated as a radiographer on that date. He began as Assistant Radiographer on February 15, 1994 at Carondelet Foundry Corporation. He has experience with the Amertest Model 650L Source Changer, Models 660A, 660B and 680B Exposure Devices.
 - B. Ron Kelley, Radiographer, completed 520 hours on-the-job training at Carondelet Foundry Corporation on February 14, 1994 and was initially designated as a radiographer on that date. He began as Assistant Radiographer on September 30, 1993 at Carondelet Foundry Corporation. He has experience with the Amertest Model 650L Source Changer, Models 660A, 660B and 680B Exposure Devices.

CARONDELET FOUNDRY COMPANY

ESTABLISHED 1890

STAINLESS STEELS • HIGH ALLOYS • GRAY IRONS

2101 S. KINGSHIGHWAY BLVD.

ST. LOUIS, MO. 63110

314 771-0906

TWX 910-761-0431 (Caron Fond STL)

MAILING ADDRESS:

P. O. BOX 7078

ST. LOUIS, MO. 63177

RADIATION SAFETY TRAINING RECORD

RADIATION RECORD RR-11 FORM

Name DARREN LAROSE

District _____

SUBJECT	REQ. HOURS	TOTAL HOURS	RADIOGRAPHER		DATE OF TRAINING	AUTHORIZED INSTRUCTOR *
			REQ. HOURS	TOTAL HOURS		
CFC Radiation Safety Orientation	2		N/A	N/A		
Fundamentals of Radiation Safety	1		6			
Radiation Detection Instrumentation (Classroom)			1			
Practical Application	1		3			
Radiographic Equipment Classroom Instruction			1			
Practical Application	2		3			
Regulations: Federal or State			3			
CFC Operating and Emergency Procedures	4		9			
Records and Reports	N/A		1			
Maintenance Procedures	N/A		2			
Case Histories	N/A		1			
Field Operations	N/A		10			
ANNUAL REFRESHER						
TRAINING			6	6	1/17/96	PAUL SIMS TESTING / R.M. SPEES.

Experienced Personnell (Enter resume of Training and experience below. Use second page if necessary.

COURSE OUTLINE + EXAM RESULTS ATTACHED

* Must be Qualified RSO or RS

I Darren Larose, certify that I have received instructions on the above mentioned subjects for the amount of time indicated above.

Date 1/18/96

RSO R.M. Spees

100% correct
1-18-96

Walter L. Huse
1/17/96

10 CFR Part 34 Rules & Regulations - Periodic Training - 20 Questions

1. X and gamma rays are a "Family of Waves" that are called "Electro-Magnetic Waves". Other electro-magnetic waves include which of the following:
 - a. radio waves
 - b. visible light
 - c. ultra-violet rays
 - ☒ d. all of the above
2. All electro-magnetic waves travel at the velocity of light which is:
 - ☒ a. 186,000 miles per second
 - b. the same as the speed of sound
 - c. 186,000 feet per second
 - d. none of the above
3. The primary difference in the properties of x-rays and gamma rays having the same frequency and wavelength is:
 - ☒ a. there is no difference
 - b. gamma rays from Cobalt 60 penetrate more steel
 - c. gamma rays are more dangerous
 - d. xrays are more dangerous
4. Cobalt-60 and Iridium-192 are:
 - a. natural isotopes
 - ☒ b. artificial isotopes
 - c. particles
 - d. none of the above
5. When a radioactive material decays, it is said to have an "activity" of one curie when 37 billion of its atoms disintegrate in one second. What is the "activity" of a radioactive source that has 148 billion disintegrations per second?
 - a. 1 curie
 - b. 10 curies
 - ☒ c. 4 curies
 - d. 10^{-6} curies
6. ☒ (True or False) The half-life of a radioisotope is the time it takes for 1/2 of the atoms of a radioisotope to decay or disintegrate.
7. (True or ☒ False) All isotopes decay or disintegrate at the same rate.
8. Which of the following radioisotopes have the longest half life?
 - ☒ a. Radium 226 (RA-226)
 - b. Cesium 137 (Cs-137)
 - c. Cobalt 60 (Co-60)
 - d. Iridium-192 (Ir-192)

9. What will be the activity of 150 curies of Ir-192 after 150 days?
- 75 curies
 - ☒ 37.5 curies
 - 150 curies
 - none of the above
10. ☒ (True) or False) The "Roentgen" (R) is not a direct measure but simply measures radiation present in the air. This relates to the amount of exposure a person would receive in the same area.
11. ☒ (True) or False) One "Milliroentgen" (MR) is 1/1000 of a "Roentgen".
12. ☒ (True) or False) The "REM" is the standard unit for record keeping of the radiation worker's biological dose.
13. ☒ (True) or False) "REM" stands for "Roentgen Equivalent Man" and is the effect produced in humans by any type of radiation".
14. ☒ (True) or False) "Dose Rate" is the time rate at which a radiation dose is received.
15. ☒ (True) or False) With X and gamma rays, the exposure rate in Roentgens per hour is the same as dose rate in REMs.
16. The primary agency for establishing dose limits in the United States is:
- the State
 - ☒ the United States Nuclear Regulatory Commission
 - the employer
 - Dept. of Health U.S.A.
17. The maximum permissible "whole body" occupational dose for a calendar quarter is:
- 1-1/4 REM
 - 1,250 MREM
 - 7-1/2 REM
 - ☒ both a and b above
18. If a radiation worker received an occupational whole body dose of 1-1/4 REM the last day of the calendar quarter and his total dose for the quarter was 1-1/4 REM,
- he must not work at a radiation job for the balance of the year
 - he must not work at a radiation job for 90 days
 - ☒ he may continue work the following day at a radiation job
 - none of the above

19. If a radiation worker received an occupational whole body dose of 1-1/4 REM the first day of a calendar quarter,
- a. she may continue work the following day at a radiation job
 - b. she must not work at a radiation job for one year
 - ☒ c. she may continue work at a radiation job the first day of the following quarter
 - d. none of the above
20. Federal Regulations have established that no person under _____ years of age can work in an area where radiographic inspections are being performed.
- a. 21
 - ☒ b. 18
 - c. 25
 - d. all of the above

COURSE OUTLINE
ANNUAL REFRESHER TRAINING—
PRESENTED BY PAUL SINN TESTING
1/17/96

1.0 FUNDAMENTALS OF RADIATION SAFETY

1.1 Characteristics of Gamma Radiation

a. Origin

1. Alpha

2. Beta

3. Gamma

b. Penetrating Ability

c. Various Usages

d. Comparison to Visible Light Rays & X-Rays

○ = AREAS COVERED

1.2 Units of Radiation Dose and Quantity of Radiation

a. Curie & millicurie

b. Roentgen

c. Dose & dose rate

d. Half-life

e. Half value layer

1.3 Hazards of excessive exposure to radiation

a. Biological effects

1. Absorption by cells

2. Effects of overexposure

3. Psychological effect

b. Maximum permissible weekly exposure

1. Thirteen week averages

2. Changes resulting from overexposure

3. How much should I receive in a week? ALARA

1.4 Radiation Detection Instruments

a. Types of instruments

1. Geiger-Mueller or Ionization type

2. Use and care

3. Why shouldn't I leave the survey instrument by the exposure device, rather than carry it out of the shooting cell each time?

b. Calibration of survey instrument

1. Self-contained sources

2. External calibration

3. How can I check the survey instrument to be sure it's working?

1.5 Levels of Radiation From Licensed Material

a. Gamma dose rates of isotopes

1. Iridium 192
2. Cobalt 60

b. Radiation levels at selected distances

1.6 Case Histories

- a. Over-exposures to radiation is nearly always a direct result of improper utilization of radiation survey instruments.
- b. Over-exposures not attributable to 1.6 a. are frequently caused by poor judgement.

Case #1 - An experienced radiographer, on the last exposure of his shift, noticed the source did not return to the shielded position when the crank was fully retracted. He surmised the source must have become disconnected some place in the exit tube. However, while he was wondering what to do the quitting time whistle blew, so he locked the exposure device and the shooting cell room and went home.

When the first shift radiographer came in he entered the shooting cell, unlocked the exposure device and began to "set-up" for his first exposure. He finally noticed his survey instrument was "off-scale". Since he hadn't made any exposures yet he decided there was something wrong with the survey meter so he left and came back with a second instrument. This instrument also was "off-scale". He finally reported the incident to the RSO.

The RSO in his infinite wisdom, knowing that both instruments had just come back from the calibration service, concluded that the company that calibrated the instruments must have done something to the instruments that made them read "off-scale". The RSO contacted the calibration service, which after a lengthy discussion, convinced the RSO that the instruments were working properly and that the "off-scale" condition was caused by the presence of a radiation field. The radiographer who had worked the previous shift was contacted by the RSO and asked if he experienced any problems with the survey meter. The radiographer said "No, but I think the source came off in the exit tube".

As a result of this incident the first shift radiographer was exposed to more radiation than he should have been. However, since the source involved was 1/8 curie of cobalt 60 he did not exceed the maximum permissible dose for the quarter.

Table 2 Gamma Radiography Overexposure Accidents, 1971-1980
A list of all radiation overexposures reported by NRC licensed radiography companies, exceeding 5 rems to the whole body or 75 rems to a part of the body*

71

No.	Date	Company	Source	Dose	Symptoms	Why Was Source Exposed?	Was a Survey Made?	Other Factors
1.	1/4/71	Black Sivalis and Bryson	9 Ci Co-60	8 rems WB	None	Radiographer apparently forgot to retract source.	No	
2.	1/12/71	Conam Inspection	27 Ci Ir-192	13 rems WB	None	Source stuck at camera entrance because of dirt and grit in crank mechanism.	Yes, but only from rear of camera. Survey did not detect source.	Occurred at change of shift.
3.	1/27/71	Jones Testing	26 Ci Ir-192	6 rems WB	None	Two sources were in use in a permanent implant facility. Radiographer cranked out the second source instead of cranking in the first source.	Apparently not	Radiographer had no training.
4.	1971 & previous year	Newport News Shipyard	0.01 Ci Co-60 (fishpole type)	2000 to 3000 rems to hand	Uncertain, but chronic radiation dermatitis is possible from these doses	Radiography supervisor handed out source in his hands over a 29-month period.	Not applicable	
5.	7/9/71	Newport News Shipyard	220 Ci Ir-192	7 rems WB	None	A rough or kinked guide tube caused the source to jam.	No, because meter was not operating.	The radiographer disconnected the gamma alarm after the source jammed because he thought the alarm was malfunctioning.
6.	9/8/71	Pittsburgh Testing	96 Ci Ir-192	600 rems or less based on lack of symptoms	None	Not fully retracted for unknown reason.	Yes, but did not carry meter to camera.	The radiographer disconnected the guide tube before locking the camera. He instinctively reached out and touched the source when he saw it. He thought it was the safety plug.
7.	9/30/71	Peabody X-Ray Engineering	73 Ci Ir-192	5 rems WB	None	Source disconnected when it got hung up at device entrance. A worn or wrong size connector was used.	No	
8.	10/20/71	Inspection Signal Services	80 Ci Ir-192	540 rems to hand	None	Upon starting work the radiographer opened the front plug and found the source there. An incompatible control cable may have been used.	No	
9.	11/71	Conam Inspection	68 Ci Ir-192	6 rems WB	None	Source jammed.	Yes	The jammed source was discovered, but the radiographer was overexposed during the recovery operation.
10.	3/24/72	Peabody/Magnaflux	70 Ci Ir-192	21 rems WB	None	Source disconnected and stayed at end of guide tube because it had not been connected properly (GI connector).	No	The radiographer was using locking as a substitute for a survey. In this case the camera locked without the source being in.
11.	7/72	Froehling and Robertson	108 Ci Ir-192	400 to 1000 rems to hand	Reddening of hand.	Source jammed at entrance to camera, then became disconnected.	No. No survey meter was available at the site.	The radiographer called the company to report the source disconnect. They told him to shake it loose, pick it up by hand, and put it back in the camera. The radiographer thought the procedure would be dangerous and refused. By phone the company told an untrained person to do the job. He did and was overexposed.
12.	9/8/72	Magnaflux Testing Laboratory, Pittsburgh	83 Ci Ir-192	10,000 rems to hands 22 rems WB	Severe burn, loss of fingers	Forgot to retract source.	No	

13.	10/17/72	Conam Inspection	80 Ci Ir-192	8 WB	None	The radiographer rolled up the control cables before locking the camera. This caused the source to creep out.	Yes	
14.	12/22/72	X-Ray Engineering	38 Ci Ir-192	22,000 to 30,000 rems to fingers	Severe burn, amputation of fingers	The radiographer confused "in" and "out." He cranked the source "out" when he wanted it "in."	No	The job was at night. The radiographer was tired and was hurrying to finish the job.
15.	1973	Duriron Co.	42 Ci Ir-192	28 rems WB	None	A radiographer's assistant entered the implant exposure room while the source was exposed. He ignored a functioning gamma alarm.	No	
16.	2/19/73	Inspection Service of Pennsylvania		5 rems WB	None	Source jammed in a crimped guide tube. Guide tube was crimped because camera had fallen earlier in the day. Pulling caused the source to disconnect.	Yes	Emergency procedures were followed, but overexposure still resulted.
17.	6/8/73	General Dynamics Electric Boat	101 Ci Ir-192	10 rems WB plus 550 rems to hip	None	Source was not quite fully retracted. A blinking warning light was ignored.	No. Survey meter was broken by a very severe blow during the work. The radiographer said he did not damage the survey meter.	There may have been a communication failure between the radiographer and his assistant, but it is also possible that he was intentionally exposed by someone.
18.	8/30/73	Universal Technical Testing Laboratories, Inc. (PA)	36 Ci Ir-192	7 rems WB & 5 rems WB	None	Source crept out of the camera when it was moved without the source being locked in.	Yes	
19.	9/15/73	American Shipbuilding Co.	60 Ci Ir-192	87 rems to hand	None	An untrained person attempted to connect the source to the control cable, but did not make a connection (AI connector).	Yes	The untrained person realized the source was out, but still disconnected the guide tube.
20.	11/7/73	Consolidated X-Ray Service Co.	45 Ci Ir-192	5 rems WB	None	Camera fell over into mud pinching the guide tube, and making retraction impossible until the guide tube was straightened. The radiographer was overexposed as he straightened the guide tube.	Yes	Difficult environmental conditions contributed to the accident.
21.	12/18/73	Pittsburgh Testing Lab		7 rems WB	None	Radiographer apparently forgot to retract source.	No	
22.	1974	Midstate Inspection Engineering	25 Ci Ir-192	9 rems WB	None	An inexperienced radiographer's assistant did not fully crank in the source.	No	Poor training was a factor.
23.	1974	Dravo Corp., Ohio		175 rems to hand and 6 rems WB	None	A radiographer forgot to retract the source at the end of his work shift. The radiographer on the next shift was exposed.	No, not by the radiographer quitting work or the radiographer on the next shift.	Hurrying to quit work was a factor.
24.	4/29/74	Conam Inspection	13 Ci Co-60	7 rems WB	None	Source jammed in the guide tube near the camera because the radiographer bent it too sharply.	No	The radiographer did not understand the limitations of the guide tube.
25.	6/4/74	U. S. Testing	20 Ci Ir-192	5 rems WB	None	Unknown	Yes, but the radiographer did not understand the meter readings.	Radiographer was not properly trained in use of survey meter.
26.	10/25/74	X-Ray Industries	52 Ci Ir-192	11 rems WB and 300 rems to eye	None	Two radiographers were working together. The radiographer who was exposed thought the other radiographer had retracted the source, but he had not.	No	Poor communication was a factor. A timing buzzer rang. One radiographer shut the buzzer off but did not crank in the source. The other radiographer assumed that since the buzzer had been shut off the source had also been cranked in. But neither radiographer had cranked the source in.
27.	3/30/75	Texas Pipe Bending Co. of Puerto Rico	Ir-192	6 rems WB	None	Unknown	Unknown	

Table 2 (continued)

No.	Date	Company	Source	Dose	Symptoms	Why Was Source Exposed?	Was a Survey Made?	Other Factors
28.	11/11/75	Value Engineering Co.		28 rems WB	None	It is possible that the radiographer forgot to retract the source, but it is also possible that he intentionally exposed his badge.	Unknown	
29.	1/8/76	X-Ray Engineering		7 rems WB	None	Unknown	Unknown	
30.	2/7/76	Exam Co.	97 Ci Ir-192	5 rems WB	None	The source was not quite fully retracted for unknown reasons.	Yes, but only the back of the camera was surveyed.	The radiographer's assistant who surveyed did not know how to survey properly.
31.	4/27/76	Exam Co.	93 Ci Ir-192	6 rems WB	None	Unknown	No. Assistant did not survey.	
32.	7/8/76	NES/Conam Inspection	44 Ci Co-60 and 92 Ci Ir-192	24 rems WB, 7 rems WB, 7 rems WB	None None None	A radiographer forgot to retract the cobalt-60 source. Upon discovering his error he cranked out the iridium-192 source thinking he was cranking in the cobalt-60 source.	Surveys were erratic, not made, or not understood.	Two sets of cranks caused confusion.
33.	7/13/76	Universal Technical Testing Laboratories, Inc. (PA)	71 Ci Co-60	6 rems WB	None	The radiographer forgot to retract the source while hurrying to finish before lunch.	Not really. The radiographer carried the meter but did not read it.	Hurrying was a factor. A gamma alarm was ringing but the radiographer shut it off.
34.	8/4/76	Globe X-Ray Services	70 Ci Ir-192	23 rems WB	None	Unknown		Unknown
35.	10/9/76	Yuba Industries	103 Ci Ir-192	6 rems WB	None	The camera was moved without being locked. Apparently the motion caused the source to creep out.	Yes.	
36.	11/3/76	Arnold Green Testing Lab	30 Ci Ir-192	10 rems WB	None	Radiographer was not careful to fully retract source.	No.	While working the radiographer became very ill. This led to incomplete retraction of the source and omission of the survey.
37.	11/4/76	NES/Conam Inspection, Rosemont, Illinois.	47 Ci Co-60	The actual doses to the two hands of two radiographers were probably less than 600 rems since no physical symptoms were present.	Apparently none.	A bend in the guide tube caused the source to jam near the camera.	Yes, but the back of the camera was surveyed and the exposed source was not detected.	Poor training in how to make a survey was a factor.
38.	11/12/76	Pittsburgh Des Moines Steel Company	94 Ci Ir-192	About 1000 rems to fingers of right hand based on physical symptoms and 5 rem WB.	A dry blister formed and fell off. No infection. Wound healed.	Source was not fully retracted (left 1 ft outside camera). No reason was identified.	No.	
39.	12/12/76	Atlantic Research	166 Ci Co-60	1100 to 1400 rems to hand	Reddening of the skin on fingers, but no fingers were lost.	Forgot to retract source.	No. In addition, a gamma alarm in the exposure room had been disconnected so that the door could be propped open to obtain ventilation.	The radiographer had come in on Sunday morning at the company's request. His wife was in the hospital having a baby, but he did not tell the company managers. There was poor communication between the radiographer and the managers.
40.	6/16/77	J. G. Sylvester Associates, Inc.	35 Ci Co-60 and 94 Ci Ir-192	400 rems to head	None	At the end of an Ir-192 exposure, the Co-60 source was cranked out by mistake instead of cranking in the Ir-192 source.	Not really. A survey meter was carried but not looked at.	

41.	9/7/77	General Dynamics Electric Boat	80 Ci Ir-192	5 rems WB	None	Source was not fully retracted.	No. The radiographer was relying on a "chirper," but the background noise was so loud he could not hear it.	
42.	11/12/77	Pittsburgh Des Moines Steel	75 Ci Ir-192	300-600 rems to fingers	None	Source did not retract to the fully shielded position.	Yes, but the survey did not include the front of the camera.	Poor survey technique.
43.	6/3/78	Union Boiler Company	85 Ci Ir-192	120 rems to thumb	None	The radiographer retracted the source and tried to lock the camera, but the camera would not lock. He retracted the source again and tried locking, again without success. He concluded that fly ash had jammed the locking mechanism.	Yes. The meter needle read off scale, but an audible speaker was silent. The radiographer concluded that moisture and fly ash had shorted the meter causing the needle to go off scale.	
44.	11/15/78	Twin City Testing Engineering Lab	Ir-192	22 rems to trunk (lower back of body)	None	The source was not fully retracted for unknown reasons.	Yes, but the survey was not complete enough to show that the source was not fully retracted.	
45.	3/7/79	Townsend and Bottom, Inc.	65 Ci Ir-192	9 rems to left calf	None	The source was retracted but not fully, perhaps because of a tight bend in the guide tube. One more turn of the crank was needed.	Yes, but not carefully.	Work being done late at night. Heavy work load. Radiographer distracted and worried by phone call from supervisor.
46.	10/10/79	Consolidated X-Ray Service Co.	Ir-192	9 rems WB	None	The source was retracted and the locking mechanism did not catch the locking ball. This allowed the source to move out of the fully shielded position when the control cable was coiled.	Yes, but the source crept out after the survey had been made.	
47.	12/13/79	Tulsa Gamma Ray, Inc.	80 Ci Ir-192	17 rems on film badge	Probably none, but individual could not be located afterwards.	Intentional exposure.	Not applicable.	The individual had been fired the day before the exposure for being drunk on the job after working for the licensee for 7 days. He returned drunk the next morning, cranked out the source, and handed his film badge to the supervisor. It is not known whether he was exposed or whether just the film badge was exposed.
48.	6/12/80	Consumers Power	55 Ci Ir-192	8 rems WB	None	The crank assembly apparently jammed so that the source was not fully retracted, unknown to the radiographer.	Yes, but the assistant radiographer did not survey the front of the camera.	

*Source: Compiled by the author from letters and reports contained in the files of the NRC's Office of Inspection and Enforcement.

NOTE: No overexposures greater than 5 rems to the whole body (WB) or 75 rems to the extremities were reported to the NRC by its radiography licensees for the period January 1, 1981, through August 31, 1981. However, two people involved in manufacturing radiography sources suffered serious damage to their hands during this period.

PAUL SINN TESTING SERVICES, INC.


This is to certify that

DAREN LaROSE

has attended and satisfactorily completed the program objectives
of a Six-Hour Radiation Safety Refresher course.

Presented this 17th day of January, 1996.


Director of Quality Assurance


Paul W. Sinn, RSO





Paul Sinn Testing Services, Inc.

Box 185 • Marissa, Illinois 62257 • Phone 618-295-2911

ATTENDANCE SHEET

Date: January 17, 1996

Subject: Radiation Safety Refresher

Instructor: Paul W. Sinn, RSO, PAUL SINN TESTING SERVICES, INC.

Instruction Time: 6 Hours

In Attendance:

R. M. Spees

R. M. Spees

Rich Huber

Rich Huber

Ronald B. Kelley

Daren LaRose

Daren LaRose

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P. O. BOX 7078

ST. LOUIS, MO. 63177

RADIATION SAFETY TRAINING RECORD

RADIATION RECORD RR-11 FORM

Name DAREN LA ROSE

District _____

SUBJECT	REQ. HOURS	TOTAL HOURS	RADIOGRAPHER		DATE OF TRAINING	AUTHORIZED INSTRUCTOR *
			REQ. HOURS	TOTAL HOURS		
CFC Radiation Safety Orientation	2		N/A	N/A		
Fundamentals of Radiation Safety	1		6			
Radiation Detection Instrumentation (Classroom)			1			
Practical Application	1		3			
Radiographic Equipment Classroom Instruction			1			
Practical Application	2		3			
Regulations: Federal or State			3			
CFC Operating and Emergency Procedures	4		9			
Records and Reports	N/A		1			
Maintenance Procedures	N/A		2			
Case Histories	N/A		1			
Field Operations	N/A		10			
ANNUAL REFRESHER						
TRAINING			6+	1/26/95		R.M. WESTER + ASSOC. R.M. SPEES/RSO

Experienced Personnell (Enter resume of Training and experience below. Use second page if necessary.)

SEE ATTACHMENTS

* Must be Qualified RSO or RS

I Donna M, certify that I have received instructions on the above mentioned subjects for the amount of time indicated above.

Date 1-26/95

RSO R.M. Spees

R.M. WESTER & ASSOCIATES, INC.

215 INDACOM DRIVE • ST. PETERS, MISSOURI 63376
(314) 928-9628 • FAX 928-9857

FOR YOUR NUCLEAR REGULATORY COMMISSION RECORDS

The following signatures indicate the presence of each of the individuals successfully participating in the course **Radiography Radiation Safety Refresher Training in compliance with 10 CFR 34.51 Appendix A and Carondelet Foundry's Operating and Emergency Procedures** presented by Dr. Clarence E. Styron, Radiation Safety Director with R. M. Wester and Associates, Inc. on January 26, 1995.

The 8-hour course covered by this seminar included regulations and other topics in Appendix A. Proficiency was demonstrated by class exercises and a written examination.

ATTENDEES

TEST SCORES

ATTENDEES

<u>Bob Huber</u>	96
<u>Ronald B. Kelley</u>	100
<u>L. H. Jones</u>	100
<u>Jim Lawrence</u>	100
<u>Daren T. White</u>	93

CERTIFIED BY: Clarence E. Styron
Radiation Safety Director

R. M. WESTER *and Associates, Inc.*

Proudly awards this certificate to

Daren J. LaRose

*In recognition of the successful completion of the course:
Radiography Radiation Safety Refresher Training*

In Compliance with 10 CFR 34.51 Appendix A and Carondelet Foundry's Operating and Emergency Procedures

Date: January 26, 1995

Robert M. Wester

Technical Director

Clarence E. Styron

Training Specialist



1/26/95

ANNUAL REVIEW
OUTLINE

R.M. WESTER & ASSOCIATES, INC.

215 INDACOM DRIVE • ST. PETERS, MISSOURI 63376

(314) 928-9628 • FAX 928-9857

RADIATION SAFETY TRAINING FOR RADIOGRAPHERS

1. Radiation Physics
 - a. Atomic Structure
 - b. Radioactivity
 - c. Units of Activity
 - d. Radioactive Decay / Half-life
 - e. Radiations
 - 1) Alpha Particles
 - 2) Beta Particles
 - a) Negatrons
 - b) Positrons
 - 3) Neutron Particles
 - 4) Gamma Rays
 - 5) X-rays
 - 6) Annihilation Radiation
 - 7) Electron Capture
 - 8) Internal Conversion
 - f. Electromagnetic Spectrum
 - g. X-ray generation
 - h. Ionization and Excitation
 - 1) Photoelectron
 - 2) Compton Effect
 - 3) Pair Production
 - 4) Auger Electrons
 - i. Radiation Detection
 - j. Radiation Measurement
 - 1) Proportional Counters
 - 2) NaI(Tl) Solid Scintillators
 - 3) Calibration and Standards

- 4) Calculations for decay correction, background, efficiencies and crosstalk
 - k. Shielding
 - l. Units of Exposure
 - m. Units of Absorbed Dose
 - n. Dose Equivalent Units
 - o. Dose vs Dose Rate
 - p. Protection: Distance, Shielding and Time
 - q. Terms
2. Radiation Biology
- a. Biological Spectrum
 - b. Early vs Late Effects
 - c. Factors Varying Effects
 - d. Acute Radiation Syndrome
 - e. Late Effects of Radiation
 - f. Tissue Sensitivity
 - g. Dose Response
 - h. Average Annual Exposure
 - i. Risk of Getting Cancer
 - j. Other Risks
3. Using Radiation
- a. Why We Use It
 - b. Radiation Safety Program
 - 1) Procedures
 - 2) Requirements
 - 3) Licenses
 - 4) Audits
 - 5) Training
 - 6) Purchasing
 - 7) Receiving
 - 8) Using
 - c. Posting Signs

4. Waste Handling Procedures
 - a. Radioactive Materials
 - b. Radiation Levels
 - c. Contamination
 - d. Disposal Procedures
 - 1) User
 - 2) Waste Handler
 - 3) Radiation Safety Officer
 - 4) Disposal Service
5. SOPs for Radiography
6. NRC Regulations, Parts 19, 20 and 34



THE CARONDELET CORPORATION

I Daren LaRose have received a copy of Appendix A Part 34.51
United States Nuclear Regulatory Commission & Training Manual.

Date 7-11-94

Signature Daren LaRose

5-6-94

QUESTIONS MISSED
WERE DISCUSSED
W/ DAREN.

95%

81
85

R.M. for RSD

RADIOGRAPHER EXAMINATION

OK

I. FUNDAMENTALS OF RADIATION SAFETY

1. Suppose you received a radiation dose of 100 mrem. Of the following, who might be affected by your exposure?
 - a. your spouse
 - b. your current children
 - c. your future children
 - d. none of the above
2. Which of the following is one function of the ALARA program?
 - a. Train radiographers in methods for reducing radiation exposure.
 - b. Prevent radiation exposure to workers handling nuclear materials.
 - c. Upgrade assistant radiographers to the level of radiographer.
 - d. Minimize a company's legal liability in accidents involving radiation.
3. Suppose an accident occurred on a job and you received a dose of 1.5 REM. Which of the following statements would be true?
 - a. This dose is much less than the NRC annual whole body limit.
 - b. This dose is below but very close to the NRC annual whole body limit.
 - c. This dose is a little more than the NRC annual whole body limit.
 - d. This dose is far above the NRC annual whole body limit.
4. Which of the following groups of people would generally be most affected by a given radiation dose?
 - a. senior citizens
 - b. middle-agers
 - c. young adults
 - d. grade schoolers

5. How many millirem are in 2.5 REM? pk
- 25 millirem
 - 250 millirem
 - 2500 millirem
 - none of the above
6. Which of the following can be used to construct a temporary radiological barrier?
- red and white rope
 - green and white rope
 - yellow and magenta rope
 - green and magenta rope
7. What is the NRC annual whole body radiation dose limit?
- 500 mrem
 - 1000 mrem
 - 5000 mrem
 - 50000 mrem
8. The term ALARA is used to identify a radiation safety program. What do the letters ALARA stand for?
- As Low As Reason Allows
 - Always Look At Radiation Activity
 - At Least A Rem Allowed
 - As Low As Reasonably Achievable
9. Define the term half-life. *The amount of time it takes for a radioactive substance to lose half of its activity by decay.*
10. What is the proper placement of dosimetry on the body? *The trunk*
11. What is the proper placement of pocket dosimeters and TLD's with relationship to each other? *Keep them in same area*
12. Define the term REM. *The unit of any of the quantities expressed as dose equivalent. The dose equivalent in rem is equal to the absorbed dose in rads multiplied by the quality factor (1 for x-rays, gamma rays, and beta particles).*
13. Define the term Curie. *The measurement we use to measure how radioactive a substance is by how many atoms are decaying each second. (37 billion a second)*
14. What are the three major methods of reducing radiation exposure? *Time, Distance, Shielding*
15. What is the half-value layer of lead for Cobalt-60? *.49 in.*
16. What is the half-value layer of steel for Cobalt-60? *.85 in.*
17. Define the Inverse Square Law. *A law of nature that states how the intensity of radiation decreases as a person moves away from a radiation source. The law states that the intensity will decrease proportionally to the distance squared.*

- 1
18. Define the term Rad. The amount of radiation energy imparted to matter per unit mass of irradiated material.
 19. Define the term Roentgen. The measure of ionization in air due to the passage of gamma or x-radiation.
 20. How do gamma radiation exposure rates in Rads and Roentgens equate to REM? Multiplying Rads by quality factor. For our purpose they are essentially the same reading.
 21. Define the term dose rate. The amount of radiation received in a amount of time.
 22. What is the dose rate from 5 Curies of Cobalt-60 at one meter? 6.5 R/HR
 23. Suppose the emission of a source of radiation is 100 roentgens per hour at one foot. What is the dose rate at 2 feet? 25 R/HR
 24. A 10 Curie source of Cobalt-60 is to be used at 10 feet from a group of workmen. What dose rate will they receive? 136 mr/HR
 25. You are working in an area of 125 mr/hr. What would be your dose in 8 hours? 1 R
 26. How much lead shielding is required to reduce a Cobalt-60 exposure of 2 R/hr to 4 mr/hr? 4.41 in.
 27. Define radiation area. An area where one could receive in excess of 5 mr/hr of radiation.
 28. Define high radiation area. An area where one could receive in excess of 100 mr/hr of radiation.
 29. Define restricted area. An area where one could receive in excess of 2 mr/hr of radiation.
 30. Define unrestricted area. An area where one could receive less than 2 mr/hr of radiation.
 31. List the four basic types of radiation. Gamma, Beta, Neutron, Alpha
 32. When should a collimator be used? Always
 33. Can an individual be fired for speaking to the NRC? No
 34. Why must a collimator be used at all times during the performance of radiography? ~~at the St. Louis, MO facility.~~
 N/A
 35. Who is primarily responsible for your radiation exposure? Yourself
 36. Who maintains personnel exposure records at your facility? RSO
 37. Questions concerning radiation exposure should first be discussed with whom? RSO

38. All items in your pockets must be removed while working with radioactive materials or they will become radioactive from gamma rays.
- a. true
 - ☒ b. false
39. Personnel are allowed to review their exposure records only when leaving the company or job.
- a. true
 - ☒ b. false
40. How does the recommended radiation dose for pregnant employees compare with the annual whole body occupational dose limit?
- a. The pregnant employee limit is HIGHER than the occupational limit.
 - b. The pregnant employee limit is HIGHER for the first five months.
 - c. The pregnant employee limit is the SAME as the occupational limit.
 - ☒ d. The pregnant employee limit is LOWER than the occupational limit.

II. RADIATION DETECTION INSTRUMENTATION

1. What actions are required if you discover that your pocket dosimeter has gone off scale? *Secure operations + are perform survey to see if device is secure. remove effected individuals until badges can be processed. Contact RSO*
2. The exposure of personnel to X-gamma radiation can be determined by means of:
- a. film badges
 - b. dosimeters
 - c. radiation meters
 - ☒ d. all of the above
3. What actions must be taken in the event of an intrusion while performing radiography? *Secure area, Notify RSO, tape and post radiation area. Gather facts, check dosimeter periodically.*
4. What would you do if during the performance of radiography you discover that your survey meter is not performing properly? *Secure area, Get a survey meter that works and survey area. Remove inoperable meter. Report to RSO*
5. Can radiography be performed if the intrusion/high radiation control system is inoperable? *No*
6. Describe the step-by-step procedure for checking a survey meter for proper operation. *Check calibration date, check batteries. Check meter with check source.*
7. During radiography, when must a survey meter be

utilized? Always

8. How often must a survey meter be calibrated? Every 3 mo.
9. What is the required dosimetry for performing radiography? Pocket Dosimeter + Film Badge
10. Describe the correct way to make a survey after an exposure. Survey the device on all sides then survey the guide tubes to see that the source is secure.
11. What is the dose rate range that a survey meter must be able to measure? $2\text{mr/hr} - 1\text{r/hr}$
12. What is the minimum dosimeter reading that must be recorded? All readings must be recorded.
13. What level of radiation is allowable at the boundary to an unrestricted area? 2mr/hr or less
14. What is the energy of a Cobalt-60 gamma? $1.17\text{MeV} + 1.33\text{MeV}$
15. What is the energy of a Iridium-192 gamma? $.3 - .61\text{MeV}$
16. What is the energy of a Cesium-137 gamma? $.662\text{MeV}$
17. When must a pocket dosimeter be zeroed? At beginning of each day on $3/4$ scale
18. Describe the procedure for zeroing a pocket dosimeter. Place dosimeter on charger press down + turn knob to adjust to zero
19. What is the required range of a pocket dosimeter? 200mr/hr
20. Under Carondelet Foundry Co. license conditions, can radiography be performed at remote locations? No

III. RADIOGRAPHIC EQUIPMENT

1. Describe, in detail, the operation of the Technical Operations Gamma Radiography System. Include safety considerations. Survey area see that no one is in the area, unblock source, rotate ring to operate, reset alarm, crank out source, retract source, enter cell with survey meter, survey device + tubes, lock device.
2. Describe, in detail, operation of Amertest Cobalt-60 series projectors. Include safety considerations. Survey area, see that no one is in the area, unblock source, rotate ring to operate, reset alarm, crank out source, retract source, enter cell with survey meter, survey device + tubes, lock device.
3. What is the maximum number of guide tubes allowed to be connected together using the Amertest projector? 3
4. Describe the daily inspections required to be performed prior to using the Model 660 exposure device. Conduct radiation survey. Visually inspect drive cables, guide tubes, remote, and locking devices for kinks, dents, cuts, improper connections or other damage to operable equipment.

5. What is the smallest bend radius allowed for the guide tube assembly of the Model 660 system?
Why is there a limit? 20 in.
6. What is the smallest bend radius allowed for the control cable housing of the Model 660 system? 36"
7. When should the cable lock be in the locked position? Anytime a radiography is not being performed
8. What actions are necessary if the radiographic source becomes jammed or disconnected in the guide tube? Secure Area, Report it to the RSO
9. What actions are required in the event of a fire?
Secure area, Contact RSO + Fire Department
10. What actions are required if during radiography you discover radiation levels greater than 2 mr/hr in an unrestricted area? Secure area, perform survey, See if anyone was exposed report to RSO
- X 11. What is the dose rate from an unshielded 10 Curie Cobalt-60 source at three feet from the source?
At 20 feet? 175 R/hr
12. What is the half-life of Cobalt-60? 5.3 yrs
13. Should an exposure device be used if any part is found to be defective or malfunctioning? No
14. Who do you notify if you discover that the radiographic source is missing? RSO
15. What postings are necessary during the performance of radiography? High radiation areas & radiation areas
16. Is an assistant radiographer allowed to perform radiography without the supervision of a radiographer? No

IV. CASE HISTORIES OF RADIOGRAPHY ACCIDENTS

1. What is the primary cause of excessive personnel exposure? Failure to use survey meter
2. Where might an individual find a listing of all current violations at this facility? RSO

5-6-94

D. REN

LaROSE

Richard H. Ren

RADIOGRAPHER'S PRACTICAL EXAMINATION

This check list is to be utilized by the examiner during a radiographic exposure to verify competency of an individual to act as a radiographer.

A. Personnel Monitoring

1. Proper dosimetry ☒
2. Zero pocket dosimeter at start of shift ☒
3. Proper placement of dosimetry on body ☒
4. Record dosimeter serial number and initial reading on exposure record sheet ☒
5. Upon completion of radiography record final pocket dosimeter reading on exposure record sheet ☒
6. Frequently check pocket dosimeter reading during exposure ☒

B. Survey Meter

1. Verify survey meter calibration is current ☒
2. Check survey meter for proper operation ☒
3. Complete survey meter daily utilization forms ☒

C. Exposure Calculations

1. Time ☒
2. Distance ☒
3. Shielding/Collimator use ☒
4. Boundary locations ☒
5. Calculate current source activity ☒

D. Alarm System

1. Verify operation of radiation/intrusion alarm system ☒

E. Exposure Device Assembly

1. Survey source upon removal from storage vault ☒
2. Complete exposure device daily utilization form ☒
3. Visual inspection of exposure device ☒
4. Visual inspection of control cable ☒
5. Visual and functional inspection of hand crank ☒
6. Visual inspection of guide tubes ☒
7. Proper connection of control unit per manufacturer directions ☒
8. Proper connection of guide tubes per manufacturer directions ☒
9. Verify maximum bend radius of guide tubes and control cables ☒

F. Posting and Area Controls

1. Verify no personnel in radiography cell ☒
2. Verify and post all restricted areas ☒

- G. Simulation of Performance of Radiography Exposure
1. Proper operation of exposure control device ✓
 2. Proper securing of exposure device upon completion of exposure ✓
 3. Proper control of exposure time ✓
- H. Survey Meter Usage
1. Survey meter properly used ✓
 2. Survey meter used during hook up, operation and securing of the exposure device ✓
 3. Use of survey meter to verify source location ✓
 4. Use of survey meter to verify boundaries to restricted areas ✓
- I. Exposure Device Disassembly and Storage
1. Properly disconnect control cables and guide tubes per manufacturer directions ✓
 2. Locking of exposure device ✓
 3. Proper control of exposure device and storage vault keys ✓
 4. Return exposure device to storage vault ✓
- J. Utilization Records
1. Verify completion and use of all utilization forms used in the performance of radiography ✓

CARONDELET FOUNDRY COMPANY

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P. O. BOX 707B

ST. LOUIS, MO. 63177

RADIATION SAFETY TRAINING RECORD

RADIATION RECORD RR-11 FORM

Name DAREN J. LA ROSE

District _____

SUBJECT	REQ. HOURS	TOTAL HOURS	RADIOGRAPHER		DATE OF TRAINING	AUTHORIZED INSTRUCTOR *
			REQ. HOURS	TOTAL HOURS		
CFC Radiation Safety Orientation	2		N/A	N/A		
Fundamentals of Radiation Safety	1		6	6+	1-94 2-15 → 3-10	R. M. WESTER *
Radiation Detection Instrumentation (Classroom)			1	1+	1-94	R. M. WESTER *
Practical Application	1		3	3+	2-15 → 3-10	R. M. WESTER *
Radiographic Equipment Classroom Instruction			1	1+	1-94	R. M. WESTER *
Practical Application	2		3	3+	2-15 → 3-10	R. M. WESTER *
Regulations: Federal or State			3	3+	4-1-94 → 4-12-94	R. M. WESTER *
CFC Operating and Emergency Procedures	4		9	9+	4-1-94 → 4-12-94	R. M. WESTER *
Records and Reports	N/A		1	1+	2-15 → 3-10	R. M. WESTER *
Maintenance Procedures	N/A		2	2+	4-1 → 4-12-94	R. M. WESTER *
Case Histories	N/A		1	1+	2-15 → 3-10	R. M. WESTER *
Field Operations	N/A		10	10+	2-15 → 3-10	R. M. WESTER *

Experienced Personnell (Enter resume of Training and experience below. Use second page if necessary.)

* - DAREN LA ROSE COMPLETED R. M. WESTER'S 40 HR "RADIATION SAFETY FOR RADIOGRAPHERS" COURSE.

* Must be Qualified RSO or RS

I Daren J. La Rose, certify that I have received instructions on the above mentioned subjects for the amount of time indicated above.

Date 4-12-94

RSO R. M. WESTER



THE CARONDELET CORPORATION

I Daren J. LaRose have received a copy of Carondelet Foundry Company's standard operating procedures and emergency procedures, as listed in radiographic programs dated January 29, 1990, and revision 2, dated February 11th, 1992, as presented by Robert Spees the radiation safety officer.

Daren J. LaRose 2/14/94
signature

ON THE JOB TRAINING HOURS LOG

DAREN J. LA ROSE

DATE	HOURS	DATE	HOURS	DATE	HOURS	DATE	HOURS
2-14-94	9	—	Total-288.5				
2-15-94	9	3-28-94	9				
2-16-94	9	3-29-94	9				
2-17-94	9	3-30-94	9				
2-18-94	9	3-31-94	9				
2-19-94	8	—	Total-324.5				
—	Total-53	4-4-94	9				
2-22-94	9	4-5-94	9				
2-23-94	9	4-6-94	9				
2-24-94	9	4-7-94	9				
2-25-94	9	4-8-94	9				
2-26-94	8	—	Total-369.5				
—	Total-97	4-11-94	9 8				
2-28-94	9	4-12-94	8				
3-1-94	9	4-13-94	8				
3-2-94	9	4-14-94	8				
3-3-94	8.5	4-15-94	8				
3-4-94	9	—	Total-409.5				
3-5-94	16	4-18-94	8				
—	Total-147.5	4-19-94	8				
3-7-94	9	4-20-94	8				
3-8-94	9	4-21-94	8				
3-9-94	9	4-22-94	8				
3-10-94	9	—	Total-449.5				
3-11-94	9	4-25-94	8				
3-12-94	3	4-26-94	8				
—	Total-149.5	4-27-94	9				
3-14-94	9	4-28-94	8				
3-15-94	9	4-29-94	8				
3-16-94	9	—	Total-490.5				
3-17-94	9	5-2-94	8				
3-18-94	9	5-3-94	8				
—	Total-240.5	5-4-94	8				
3-21-94	9	5-5-94	8				
3-22-94	9		522.5				
3-23-94	9						
3-24-94	9						
3-25-94	6						
3-26-94	6						

2 M. for 250 FOR CARPENTRY CORP.

Daren J. LaRose

APPLICATION FOR THE ASNT CERTIFICATION FOR RADIATION SAFETY PERSONNEL

Instructions: Please print or type all information.

Complete all portions of the application. Provide your current mailing address, phone number and two color passport photos, 1½ inch square. Include the proper amount of fee with application as checked in the provided box/boxes, payable to The American Society for Nondestructive Testing, Inc. You must provide documentation of: 40 hours formal classroom training in radiation safety practices; 520 hours on-the-job training experience in gamma-ray; and 350 hours on-the job training experience in x-ray. Practical examination forms will be provided to you.

Name (last, first, middle initial)

LaRose Daren J

Current Mailing Address

2953 Meyer Rd
NUMBER AND STREET

Festus
CITY

Mo. 63028
STATE ZIP

(314) 937-4218
TELEPHONE

Social Security Number

498-64-8966

Date of Birth

11 8 69
MONTH DAY YEAR

Place of Birth

Ste Genevieve Mo
CITY STATE

Ste Genevieve
COUNTY

Check Appropriate Notation:

- ☐ ASNT Member _____ (number)
☒ Nonmember

Applicant Classification

- ☒ First-time Application
☐ Retaking Failed Examination
☐ Renewal of Certification

**Certification Examination of
(check one):**

- ☒ Radioactive Materials
☐ X-Ray
☐ Both

Current Employer

Carondelet Corporation
NAME

8600 Commercial Blvd.
NUMBER AND STREET

Pevely
CITY

Mo 63070-1528
STATE ZIP

(314) 479-4499
TELEPHONE

Travel

Applicants must provide their own arrangements for travel, meals and hotel accommodations. Applicants will be advised of the location in which the examination will be held. ASNT will administer exams in your geographical area provided there are 25 or more applicants per exam site.

15



Please use the space provided on the back of this application for Employment History and Radiation Safety Training completed and applicable to meet the qualification prerequisites.



The American Society for Nondestructive Testing, Inc.

March 12, 1996

Daren J. LaRose
2953 Meyer Road
Festus, MO 63028

RE: IRRSP Exam Results/St. Louis, MO 02/24/96

Dear Mr. LaRose:

I am pleased to advise you that you have passed the written IRRSP examination in Radioactive Materials with 82%. Enclosed you will find your certification card.

Please feel free to contact me should you have any questions.

Sincerely,

Kathy Cooper
Certification Assistant

kmc
enclosures

LIST OF TRAINING PROGRAM COMPLETED AND APPLICABLE TO QUALIFICATION FOR CERTIFICATION. List the radiation safety programs completed as well as the name and location of the licensee where training was completed. Use additional sheets of paper as needed.

Applicant must provide documentation of 40 hours formal classroom training in radiation safety practices.

RADIATION SAFETY FOR RADIOGRAPHERS / R.M. WESTER & ASSOCIATES
TRAINING PROGRAM SOURCE
215 INDACOM DR. ST. PETERS, MO. 63376
Complete mailing address

TRAINING PROGRAM SOURCE
Complete mailing address

TRAINING PROGRAM SOURCE
Complete mailing address

TRAINING PROGRAM SOURCE
Complete mailing address

EMPLOYMENT HISTORY APPLICABLE TO CERTIFICATION PROGRAM QUALIFICATIONS. Provide the name of the employer, address, dates of employment, and hours of experience accumulated by category (i.e. gamma-ray or x-ray).

Applicant must provide documentation of 520 hours on-the-job training experience for gamma-ray; 350 hours on-the-job training experience for x-ray.

CARONDELET CORP. 12/1/92 THRU CURRENT 520 HRS +
EMPLOYER DATES OF EMPLOYMENT ACCUMULATION OF HOURS BY CATEGORY
SEE OJT LOG.
Complete mailing address

EMPLOYER DATES OF EMPLOYMENT ACCUMULATION OF HOURS BY CATEGORY
Complete mailing address

EMPLOYER DATES OF EMPLOYMENT ACCUMULATION OF HOURS BY CATEGORY
Complete mailing address

FEES

Fees are non-refundable unless written notification is received by the IRRSP Program Manager 45 days prior to the scheduled examination. Check the appropriate space and send the correct amount to ASNT. Payment must be in the form of a bank money order, Visa, MasterCard, Discover Card, American Express, company purchase order, company check, or personal check.

- ☐ \$105 ASNT Member Examination and Certification Fee
☒ \$150 Non-Member Examination and Certification Fee
☐ \$45 is applicable towards ASNT membership; check here if you desire this amount applied to a one-year membership.
☐ \$ 70 Retake Examination Fee (ASNT members and non-members)

STATEMENT REQUIREMENTS

Signature on this application form acknowledges that the candidate subscribes to the following:

*If certified by ASNT, I agree to abide by the ASNT Industrial Radiography Radiation Safety Personnel (IRRSP) Rules of Conduct as interpreted by ASNT for the period of the certification. I acknowledge that ASNT Certification is not a personal or property right to which I am entitled, but is recognition which is granted by ASNT on the basis of my qualifications, successful completion of examinations, and my willingness to abide by and be governed by the ASNT IRRSP Rules of Conduct for the term of certification. As such, I agree that ASNT, upon written complaint, notice, and hearing, may censure me or suspend or revoke the ASNT Certification in the event of a determination that I have violated the rules governing the ASNT Certification. I further agree that certification which may result from this application arises solely pursuant to the requirement set forth by The American Society for Nondestructive Testing, Inc. and does not constitute any form of license issued by federal, state, local regulatory, or governing body. I further acknowledge that any requirement for ASNT Certification is within the sole discretion of any government authority, public or private employer who specifies this status as a condition of employment or other qualification. I hereby attest that all entries made on the application form are true and correct, and no information that might be detrimental to my certification has been withheld. ASNT may make any inquiries necessary to determine my qualifications for certification. I agree to abide by the decision of ASNT relative to the granting of the ASNT Industrial Radiography Radiation Safety Personnel Certification, as applied.

In consideration of the acceptance and processing of my application for ASNT IRRSP Certification, I release and forever discharge The American Society for Nondestructive Testing, Inc. from any and all liabilities, claims, demands, or causes of action as an ASNT Industrial Radiography Radiation Safety Personnel certified individual. In addition, I agree to indemnify and hold harmless ASNT from any claims by third parties asserted against ASNT, as a result of the ASNT IRRSP Certification granted to me.

Dan J. M.
SIGNATURE OF APPLICANT
10-4-95
DATE
Janet Schaughnessy 10/4/95
SIGNATURE OF NOTARY PUBLIC DATE
7/25/96
COMMISSION EXPIRATION

SEND COMPLETED FORM TO:
ASNT - IRRSP PROGRAM MANAGER
1711 Arlingate Lane
P.O. Box 28518
Columbus, Ohio 43228-0518
(800) 222-2768 • (614) 274-6003 • FAX: (614) 274-6899

REMEMBER TO KEEP A COPY OF THIS FORM FOR YOUR FILES.



The American Society for Nondestructive Testing, Inc.

March 12, 1996

Daren J. LaRose
2953 Meyer Road
Festus, MO 63028

RE: IRRSP Exam Results/St. Louis, MO 02/24/96

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Please feel free to contact me should you have any questions.

Sincerely,

Kathy Cooper
Certification Assistant

kmc
enclosures

RAM ☒
X-RAY ☐

PRACTICAL EXAMINATION FOR INDUSTRIAL RADIOGRAPHY RADIATION SAFETY PERSONNEL (IRRSP)

IRRSP Personnel DAREN J. LAROSE
Radiographic Location CARDONDELET CORP. Date 10/3/95 Time 1600
Radiation Source IR 192 Curies/KV 40 Serial No. A5363
Projector Serial No. A4857 Projector Model No. 660 A
Survey Meter Model No. LUDLUM MODEL 6 Serial No. 90333 Calibration Due 10/18/95

- | | YES | NO |
|--|-------------------------------------|-------------------------------------|
| 1. Was the radiographer wearing a film badge and dosimeter? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2. Were other individuals working within the restricted area wearing film badges and dosimeters? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 3. Was the restricted area posted with "CAUTION" (or DANGER) "RADIATION AREA" signs? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 4. Was the restricted area properly controlled to prevent unauthorized entry? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 5. Was the high radiation area posted with "CAUTION" (or DANGER) "HIGH RADIATION AREA" signs? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 6. Did the IRRSP have a calibrated and properly operating survey meter? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 7. Was the utilization log properly completed? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 8. Did the IRRSP have sufficient knowledge of safety rules as ascertained by oral inquiry? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 9. Was the IRRSP working with defective equipment? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

YES NO

10. Did the IRRSP properly survey the entire source projector and source tube (isotope) or area (x-ray)? ☒ ☐
11. Was the radiation producing equipment stored properly and kept locked to prevent unauthorized removal or use? ☒ ☐
12. Was the storage area posted with "CAUTION" (or DANGER) "RADIOACTIVE MATERIAL" signs (isotope only)? ☒ ☐
13. Did the IRRSP have ready access to operating and emergency procedure and regulations for protection against ionizing radiation? ☒ ☐
14. Were there any items of concern other than those listed on this form? If any, explain in "Remarks." ☐ ☒

Remarks:

The IRRSP's performance was:

- ☒ Satisfactory
- ☐ Unsatisfactory, needs additional training
- ☐ Unsatisfactory, further activities prohibited
- ☐ If applicable, instruction provided

initials/date

If applicable, describe disciplinary actions above:

Conducted by

R.M. Fair

RSD

Date 10/4/95

CARONDELET CORP.

24-26136-01

MO.

LICENSEE

LICENSEE NO.

STATE

State of

Missouri

County of

Jefferson

SS:

Sworn to and subscribed before me this 4th day of October, 19 95Janet Schaughnessy
NOTARY PUBLICMy commission
expires 7/25/96

- (A) ① The first thing you do is using a survey meter survey the storage vault projector. Then visually inspect the projector, guide tubes and control cable assembly. Unlock projector + hook up control cables. After hook up place selector ring in lock position. Then hook up source guide tubes. Make sure everything is properly connected. Make sure there's no one in the ^{Exclusion Area} exposure room. On back projector place selector ring to operate position. Return to drive control unit. Rapidly rotate crank in expose direction (counter clockwise) till ^{reaches} stop position. Set brake. After exposure time retract source set brake. Enter exposure room with survey meter + survey all side of projector + source guide tubes place selector ring on lock position.
- (A) ② Using survey meter survey projector. Visually check projector components, guide tubes, control unit for damage or defects. Complete form PB-1

(C)

Page 2

(1) Time - The less time exposed the less ^{radiation} you will receive.

Distance - The farther you are from source the less radiation you will receive.

Shielding - The more shielding between you and the source the less radiation you will receive.

(C)

9. Curie - A basic unit to describe the intensity of radioactivity in a material. It's a measure of the rate of which a radioactive material throws off particles or disintegrates.

Rem - A unit of radiation dose - NO REG

Dose - the amount of radiation absorbed by an object

Dose Rate - a measure of how fast a radiation dose is being received.


Restricted Area - An area to which access is controlled for the purpose of radiation protection.

2 mrem/hr or more

Inverse Square Law - A law of nature that states how the intensity of radiation decreases as a person moves away from a radiation source. States that the intensity will decrease proportionately to the distance squared.

(C)

Page 3

- (12) You must post radiation area signs generally at the restricted area boundary, and you must post high radiation area  signs anywhere the dose is sufficient to expose anyone to dose of 100 mrem in any one hour

High Radiation Area - 100 mrem/Hr

Radiation Area - 5 mrem/Hr

Restricted Area 2 mrem/Hr

DAREN LaRose

2-15-94

Radiographer's Assistant Practical Examination

This check list is to be utilized by the examiner (Mr. Lanny Reed) during a simulated radiographic exposure to verify competency of an individual to act as a radiographer's assistant.

ACCEPTABLE

R.M. for

PSO

Richard Hahn

A. Personnel Monitoring

1. Proper dosimetry OK
2. Zero pocket dosimeter at start of shift OK
3. Proper placement of dosimetry on body OK
4. Record dosimeter serial number and initial reading on exposure record sheet OK
5. Upon completion of radiography record final pocket dosimeter reading on exposure record sheet OK
6. Frequently check pocket dosimeter reading during exposure OK

B. Survey Meter

1. Verify survey meter calibration is current OK
2. Check survey meter for proper operation OK
3. Complete survey meter daily utilization form OK

RR-13

C. Exposure Calculations

1. Time OK
2. Distance OK
3. Shielding/Collimator use OK
4. Boundary locations OK
5. Calculate current source activity OK

D. Alarm System

1. Verify operation of radiation/intrusion alarm system OK

E. Exposure Device Assembly

1. Survey source upon removal from storage vault OK
2. Complete exposure device daily utilization form OK
3. Visual inspection of exposure device OK
4. Visual inspection of control cable OK
5. Visual and functional inspection of hand crank OK
6. Visual inspection of guide tubes OK
7. Proper connection of control unit per manufacturer directions OK
8. Proper connection of guide tubes per manufacturer directions OK
9. Verify maximum bend radius of guide tubes and control cables OK

RR-1

F. Posting and Area Control

1. Verify no personnel in radiography cell OK
2. Verify and post all restricted areas OK

DAREN LaROSE

2-15-94

Radiographer's Assistant Practical Examination

This check list is to be utilized by the examiner (Mr. Lanny Reed) during a simulated radiographic exposure to verify competency of an individual to act as a radiographer's assistant.

ACCEPTABLE

R.M. for

RSD

Richard Hahn

A. Personnel Monitoring

1. Proper dosimetry OK
2. Zero pocket dosimeter at start of shift OK
3. Proper placement of dosimetry on body OK
4. Record dosimeter serial number and initial reading on exposure record sheet OK
5. Upon completion of radiography record final pocket dosimeter reading on exposure record sheet OK
6. Frequently check pocket dosimeter reading during exposure OK

B. Survey Meter

1. Verify survey meter calibration is current OK
2. Check survey meter for proper operation OK
3. Complete survey meter daily utilization form OK

RR-13

C. Exposure Calculations

1. Time OK
2. Distance OK
3. Shielding/Collimator use OK
4. Boundary locations OK
5. Calculate current source activity OK

D. Alarm System

1. Verify operation of radiation/intrusion alarm system OK

E. Exposure Device Assembly

1. Survey source upon removal from storage vault OK
2. Complete exposure device daily utilization form OK
3. Visual inspection of exposure device OK
4. Visual inspection of control cable OK
5. Visual and functional inspection of hand crank OK
6. Visual inspection of guide tubes OK
7. Proper connection of control unit per manufacturer directions OK
8. Proper connection of guide tubes per manufacturer directions OK
9. Verify maximum bend radius of guide tubes and control cables OK

RR-1

F. Posting and Area Control

1. Verify no personnel in radiography cell OK
2. Verify and post all restricted areas OK

- G. Simulation of Performance of Radiography Exposure
1. Proper operation of exposure control device OK
 2. Proper securing of exposure device upon completion of exposure OK
 3. Proper control of exposure time OK
- H. Survey Meter Usage
1. Survey meter properly used OK
 2. Survey meter used during hook up, operation and securing of the exposure device OK
 3. Use of survey meter to verify source location OK
 4. Use of survey meter to verify boundaries to restricted areas OK
- I. Exposure Device Disassembly and Storage
1. Properly disconnect control cables and guide tubes per manufacturer directions OK
 2. Locking of exposure device OK
 3. Proper control of exposure device and storage vault keys OK
 4. Return exposure device to storage vault OK
- J. Utilization Records
1. Verify completion and use of all utilization forms used in the performance of radiography OK



ASSISTANT RADIOGRAPHERS - PRACTICAL

DAILY UTILIZATION FORM

RADIATION RECORD RR-1 FORM

DATE 2-15-94

SHIPPER'S CERTIFICATION FOR RADIOACTIVE MATERIALS					
No. of Pkg.	Proper shipping name	UN	Total Net Quantity	Radionuclide	Form
1	Radioactive Material Special Form N.O.S.	002974		Iridium 192	Special Form N.O.S.
Activity		Category of Labels	Transportation Index	Package Identification	
43 Ci				USA-9033-B	

Exposure Device No. 4867 Iridium 192 S/N 9317 Time 6:00 AM

Survey the surface of the exposure device and record results 6 mR

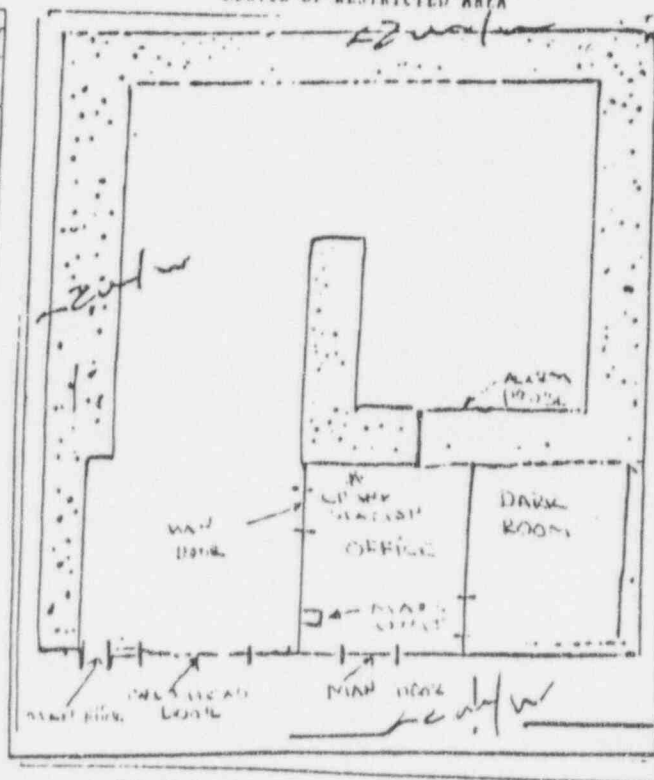
Serial Number of Survey Meter 90333 Film Badge Number 022

Dosimeter Reading 0 Remarks: _____

CHEK LIST

CASE	<input checked="" type="checkbox"/>
SOURCE SHIELDING	<input checked="" type="checkbox"/>
ALARM SYSTEM	<input checked="" type="checkbox"/>
SOURCE POSITIONING CONTROL MECHANISM FOR EXTERNAL EXPOSURES	<input checked="" type="checkbox"/>
CAMERA LOCKING DEVICE	<input checked="" type="checkbox"/>
DRIVE CABLE LOCKING DEVICE	<input checked="" type="checkbox"/>
CONDUIT - SOURCE EXIT	<input checked="" type="checkbox"/>
CONDUIT - DRIVE CABLE	<input checked="" type="checkbox"/>
CONDUIT - DRIVE CABLE STORAGE	<input checked="" type="checkbox"/>
HALL STOP	<input checked="" type="checkbox"/>
DISCONNECT YOKI	<input checked="" type="checkbox"/>
DRIVE CABLE	<input checked="" type="checkbox"/>
DRIVE CABLE CONNECTOR	<input checked="" type="checkbox"/>
QUICK DISCONNECT	<input checked="" type="checkbox"/>
EXPOSURE SELECTOR RING	<input checked="" type="checkbox"/>

SKETCH OF RESTRICTED AREA



END OF SHIPT

EXPOSURE DEVICE SURVEY AT SURFACE 6 mR SURVEY STORAGE VAULT less than 2 mR

RADIOGRAPHER Danet bla LEVEL _____ TIME IN _____

LEAK TEST DATE 11/12/93

INSTRUMENT CONSISTENCY/PERFORMANCE CHECK

UNDIATED FORM

Instrument: Ludlum Model 6 90333

Source: SMA CS/137

Description of the source/detector geometry: At Detector

Acceptable instrument response: yes + 10%

Frequency for performing consistency check:
Prior to and directly after each use.

[illegible]

90%

2-15-94

Assistant Radiographer Examination

QUESTIONS MIS
WERE DISCUSSED
W/ D. LA ROSE

A. Radiographic Equipment

- ✓ 1. Describe, in detail, the operation of Amersham Model 660 series Gamma Radiography System: Pg. 2
- ✓ 2. What is the maximum number of guide tubes allowed to be connected together? 3
- ✓ 3. Describe the daily inspections required to be performed prior to use of the exposure device: Pg. 2
- ✓ 4. What is the maximum bend radius allowed for a guide tube assembly? Never less than 20 inches
- ✗ 5. What is the maximum bend radius allowed for the control cable assembly? Not less than 3 inches
- ✓ 6. When should the selector ring be in the locked position? whenever not making an exposure
- ✓ 7. When should a collimator be used?
whenever making an exposure that is mainly needed in one direction. Always unless making a panoramic exposure
- N/A 8. What is the maximum time a panoramic exposure can be performed in one hour? Why?
- ✓ 9. Describe, in detail, the procedure for connecting the control unit to the exposure device: Survey Projector Visually project & control assembly. Remove Safety Cap. Connect control assembly projector & relock projector. ~~lock~~

B. Emergency Procedures

- ✓ 1. What actions are required if you discover that your pocket dosimeter has gone off scale? Secure radiography operations, device, perform survey. Investigate all off scale dosimeter readings. If over exposure remove individual from radiation area. Send in film badges. If over exposure must contact agency on writing
- ✓ 2. What actions are necessary to be taken in event of an intrusion while performing radiography?
Secure Area - Notify RSO - Secure Area & Post Signs - Gather Facts
- ✓ 3. What would you do if during the performance of radiography you discover that your survey meter is not performing properly? Report malfunction & take meter out of service
- ✓ 4. Who do you notify if you discover that the radiographic source is missing? ~~Report~~ Secure area - Notify RSO - S and Post Signs; gather facts check dosimeter for period. Call
- ✓ 5. Can radiography be performed if the intrusion/high radiation area control system is inoperable? NO
- ✓ 6. What actions are necessary if the radiographic source becomes jammed or disconnected in the guide tube?
Stop whatever doing & secure area contact RSO
- ✗ 7. What actions are necessary in the event of a fire?
Secure Area - Contact RSO - Secure area & post signs - gather facts, check

- X 8. What actions are required if during radiography you discover radiation levels greater than 2 mr/hr in an unrestricted area? ~~Retract Source~~ - Survey Area - Contact RSO
DETERMINING IF ANYONE EXPOSED TO > 2 mr/hr

C. Radiation Safety

- ✓ 1. There are certain fundamentals involved when controlling exposure of radiation to the body. What are these fundamentals and describe how they minimize exposure to personnel: Pg. 2
2. Describe the step-by-step procedure for checking a survey meter for proper operation: Check battery - Then use check sources to see if functioning properly
- ✓ 3. During radiography when must a survey meter be utilized? Always
- ✓ 4. How often must a survey meter be calibrated? Every 90 days
- ✓ 5. What is the required dosimetry for performing radiography? All radiographic personnel shall be monitored with film badges + pocket dosimeter
- ✓ 6. Describe the correct way to make a survey after an exposure: Lock exposure + survey 360 degrees around device + source tube from end to end
- ✓ 7. What is the dose rate range that a survey meter must be able to measure? 2 mR/hr through 1 r/hr
- ✓ 8. How much lead is required to reduce Iridium 192 radiation with an intensity of 6000 mr/hr to 2 mr/hr? 2.28" is
- ✓ 9. Define the following terms: Pg. 2
- a) Curie
 - b) REM
 - c) Dose
 - d) Dose Rate
 - e) Restricted Area
 - f) Inverse Square Law
- ✓ 10. What would be the dose rate from an unshielded 40 curie Iridium 192 source at three feet from the source? At 20 feet?
22.2 R/hr + 5 R/hr
- ✓ 11. What is the minimum dosimeter reading that must be recorded? Any reading must be recorded
- ✓ 12. Describe, in detail, what is to be posted during radiographic exposure: Pg. 3
- ✓ 13. What level of radiation is allowable at the boundary to an unrestricted area? 2 mrem per/hr
Less than

- ✓ 14. What is the energy of a Iridium 192 gamma?
From 0.3 MeV to 0.61 MeV
- X 15. When must a pocket dosimeter be zeroed?
Every day before using it.
- ✓ 16. What information is listed on Carondelet Foundry's Radiation Form RR-1? Daily Utilization Form. Lists information on survey meter & the survey and visual inspection of projector & assembly, alarm system. Also contains radiography badge no. & leak test date.
- ✓ 17. Define the term half-life: The time it takes for half the atoms in radioactive sample to decay.
- ✓ 18. What is the half-life for Iridium-192? 74.2 Days
- ✓ 19. When must the radiography device be located in the storage vault? ~~when~~ At the end of each day + when no Authorized personnel or present + when being transported
- ✓ 20. Describe the procedure for zeroing a pocket dosimeter: press dosimeter down on charger ~~and~~ and rotate switch till dosimeter is zeroed recheck
- ✓ 21. (a) What is the most common material used as a shield to reduce radiation intensities? Lead
- ✓ 1/2 (b) How much of the above material would be required to reduce the radiation intensity at 25 feet to 5 mr/hr, assuming that you have 80 mr/hr at 50 feet from an Iridium 192 source?
95 inch

CARONDELET FOUNDRY COMPANY

ESTABLISHED 1890

STAINLESS STEELS • HIGH ALLOYS • GRAY IRONS

2101 S. KINGSHIGHWAY BLVD.

ST. LOUIS, MO. 63110

314 771-0906

TWX 910-761-0431 (Caron Found STL)

MAILING ADDRESS:

P. O. BOX 7078

ST. LOUIS, MO. 63177

RADIATION SAFETY TRAINING RECORD

RADIATION RECORD RR-11 FORM

Name DAREN J. LaROSE

District _____

SUBJECT	ASSISTANT		RADIOGRAPHER		DATE OF TRAINING	AUTHORIZED INSTRUCTOR *
	REQ. HOURS	TOTAL HOURS	REQ. HOURS	TOTAL HOURS		
CFC Radiation Safety Orientation	2	2	N/A	N/A	2-15-94	R.M. <i>frust</i> - RSO
Fundamentals of Radiation Safety	1	1	6		2-14-94	R.M. <i>frust</i> - RSO
Radiation Detection Instrumentation (Classroom)			1			
Practical Application	1	1	3		2-15-94	R.M. <i>frust</i> RSO
Radiographic Equipment Classroom Instruction			1			
Practical Application	2	2	3		2-14-94	R.M. <i>frust</i> RSO
Regulations: Federal or State			3			
CFC Operating and Emergency Procedures	4	4	9		2-14-94	R.M. <i>frust</i> RSO
Records and Reports	N/A		1			
Maintenance Procedures	N/A		2			
Case Histories	N/A		1			
Field Operations	N/A		10			

Experienced Personnell (Enter resume of Training and experience below. Use second page if necessary.)

DAREN LAROSE HAS RECEIVED, IN ADDITION TO THE ABOVE TRAINING; 7.5 HRS OF CLASSROOM TRAINING ON SUBJECTS, PRESCRIBED BY CAF'S TRAINING OUTLINE FOR ASSISTANT RADIOGRAPHERS.

DAREN LAROSE HAS ALSO COMPLETED R.M. WESTER'S 40 HR RADIATION SAFETY COURSE. (1-94)

* Must be Qualified RSO or RS

I Daren J. LaRose, certify that I have received instructions on the above mentioned subjects for the amount of time indicated above.

Date 2-15-94

RSO

R.M. *frust*

R. M. WESTER and Associates, Inc.

Proudly awards this certificate to

Daren J. LaRose

In recognition of the successful completion of the course:

*Radiation Safety for Radiographers, 40 hr
In Compliance with Training Program for Radiographers
as Outlined in Carondelet Foundry's Radiation Protection
Program, Revision 2, Dated February 1, 1992*

Date: January 27, 1994

Robert M. Wester

Technical Director

Clarence E. Styron

Training Director



LICENSE FEE REQUIREMENTS

LICENSE FEE AND DEBT COLLECTION BRANCH
DIVISION OF ACCOUNTING AND FINANCE
OFFICE OF THE CONTROLLER
U.S. NUCLEAR REGULATORY COMMISSION
WASHINGTON, DC 20555-0001CARBONDELET CORPORATION
ATTN: RICHARD HUBER
QUALITY ASSURANCE /
RADIATION SAFETY COORDINATOR
8600 COMMERCIAL BOULEVARD
PEVELY, MISSOURI 63070

TYPE OF ACTION

- ☐ NEW LICENSE
☐ RENEWAL OF LICENSE
☒ AMENDMENT TO LICENSE

REQUESTED DATE

11-22-96

LICENSE NUMBER

24-26136-01

CONTROL NUMBER

302071

I. APPLICATION FEE DUE

Your request for a licensing action is subject to the fee(s) in the category(ies) noted below in accordance with Section 170.31 of the enclosed Federal Register notice. Payment of the fee is required prior to the issuance of the license, renewal, or amendment.

FEE CATEGORY	APPLICATION	RENEWAL	AMENDMENT
30	\$	\$	\$ 720.00
	\$	\$	\$
	\$	\$	\$
	\$	\$	\$
	\$	\$	\$
	\$	\$	\$
	\$	\$	\$
	\$	\$	\$
	\$	\$	\$
	\$	\$	\$

FEE(s) DUE	\$	720.00
PAYMENT RECEIVED	\$	690.00
AMOUNT DUE	\$	30.00

☐ Your request was received without the prescribed application fee.

☒ We received your Check No. 20200 in the amount of \$ 690.00. Payment of the additional fee noted above is required.

☐ Your request will increase the scope of your license program. Therefore, your request is subject to the application fee(s) noted above. Refer to Section 170.31 and Footnote 1(d)(2).

☐ Your license expired prior to the receipt of your application for renewal. Therefore, your request is subject to the application fee(s) noted above. Refer to Section 170.31 and Footnote 1(a).

MAKE PAYMENT OF THE FEE(S) TO THE U.S. NUCLEAR REGULATORY COMMISSION AND MAIL THE PAYMENT TO THE ADDRESS LISTED AT THE TOP OF THIS FORM. IF WE DO NOT RECEIVE A REPLY FROM YOU WITHIN 30 CALENDAR DAYS FROM THE DATE LISTED BELOW, WE SHALL ASSUME THAT YOU DO NOT WISH TO PURSUE YOUR APPLICATION AND WILL VOID THIS ACTION.

SIGNATURE -- LICENSE FEE ANALYST

LFDCB

LFDCB

SHIRLEY CRUTCHFIELD

12/4/96

II. FEE NOT REQUIRED

☐ Enclosed is Check No. _____ which accompanied your request. The fee is not required because:

☐ We received your Check No. _____ in payment of the fee.

☐ The Licensing staff has informed us that your request is to be considered as a continuation of your request dated _____, Control No. _____.

☐ Your request was combined, prior to review, with your _____ request, Control No. _____.

III. CHECK RETURNED

☐ Enclosed is Check No. _____ which was returned to us by the bank for:

- ☐ INSUFFICIENT FUNDS
☐ ACCOUNT CLOSED
☐ OTHER

MAIL THE REPLACEMENT CHECK TO THE ADDRESS LISTED AT THE TOP OF THIS FORM AND REFERENCE THE ABOVE CONTROL NUMBER.

IV. LICENSE ISSUED WITHOUT THE REQUIRED FEE

☐ License No. _____, Amendment No. _____, issued on _____ was issued without the required fee being collected. The fee required is noted in Section I of this form.

☐ The scope of your licensed program was increased. Therefore, your request is subject to the application fee(s) noted in Section 1 of this form. Refer to Section 170.31 and Footnote 1(d)(2).

☐ Because of the urgency of your request, the license was issued without remittance of the prescribed fee noted in Section 1 of this form.

Distribution:

Pending Fee File OC/DAF/SF(LF-3.2.7)

LFARB R/F (2)

Region 2

DATE

Dec. 4/1996

DEC 02 1996

Richard Huber
Quality Assurance and
Radiation Safety Coordinator
Carondelet Foundry Company
d/b/a The Carondelet Corporation
8600 Commercial Boulevard
Pevely, MO 63070-1528

Dear Mr. Huber:

Enclosed is Amendment No. 06 to your NRC Material License No. 24-26136-01 in accordance with your request.

Please review the enclosed document carefully and be sure that you understand all conditions. If there are any errors or questions, please notify the U.S. Nuclear Regulatory Commission, Region III office at (630) 829-9887 so that we can provide appropriate corrections and answers.

Please be advised that your license expires at the end of the _____ in the month, and year stated in the license. Unless your license has been terminated, you must conduct your program involving byproduct materials in accordance with the conditions of your NRC license, representations made in your license application, and NRC regulations. In particular, note that you must:

1. Operate in accordance with NRC regulations 10 CFR Part 19, "Notices, Instructions and Reports to Workers; Inspections," 10 CFR Part 20, "Standards for Protection Against Radiation," and other applicable regulations.
2. Notify NRC, in writing, within 30 days:
 - a. When the Radiation Safety Officer permanently discontinues performance of duties under the license or has a name change; or
 - b. When the licensee's mailing address changes (no fee is required if the location of byproduct material remains the same).

302071

3. In accordance with 10 CFR 30.36(b) and/or license condition, notify NRC, promptly, in writing, and request termination of the license when you decide to terminate all activities involving materials authorized under the license.
4. Request and obtain a license amendment before you:
 - a. Change Radiation Safety Officers;
 - b. Order byproduct material in excess of the amount, or radionuclide, or form different than authorized on the license;
 - c. Add or change the areas of use or address or addresses of use identified in the license application or on the license; or
 - d. Change ownership of your organization.
5. Submit a complete renewal application with proper fee or termination request at least 30 days before the expiration date of your license. You will receive a reminder notice approximately 90 days before the expiration date. Possession of byproduct material after your license expires is a violation of NRC regulations. A license will not normally be renewed, except on a case-by-case basis, in instances where licensed material has never been possessed or used.

In addition, please note that NRC Form 313 requires the applicant, by his/her signature, to verify that the applicant understands that all statements contained in the application are true and correct to the best of the applicant's knowledge. The signatory for the application should be the licensee or certifying official rather than a consultant.

You will be periodically inspected by NRC. Failure to conduct your program in accordance with NRC regulations, license conditions, and representations made in your license application and supplemental correspondence with NRC will result in enforcement action against you. This could include issuance of a notice of violation, or imposition of a civil penalty, or an order suspending, modifying or revoking your license as specified in the General Policy and Procedures for NRC Enforcement Actions. Since serious consequences to employees and the public can result from failure to comply with NRC requirements,

R. Huber

-3-

prompt and vigorous enforcement action will be taken when dealing with licensees who do not achieve the necessary meticulous attention to detail and the high standard of compliance which NRC expects of its licensees.

Sincerely,

Original Signed By
James R. Mullauer, M.H.S.
Health Physicist
Nuclear Materials Licensing Branch

License No. 24-26136-01
Docket No. 030-31524

Enclosure: Amendment No. 06

DOCUMENT NAME: M:\03031524.CLV

To receive a copy of this document, indicate in the box: "C" = Copy without attachment/enclosure "E" =
Copy with attachment/enclosure "N" = No copy

OFFICE	DNMS/BIH								
NAME	JRMullauer:brt								
DATE	11/27/96								

OFFICIAL RECORD COPY



THE CARONDELET CORPORATION

November 27, 1996

United State Nuclear Regulatory Commission
Nuclear Licensing Branch
Region III
801 Warrenville Road
Lisle, IL 60532-4351

Re: Change of Radiation Safety Officer For Material
License No. 24-26136-01

Dear Sir:

Enclosed is a check for \$30.00 which is the difference between the amount sent on November 22, 1996 and the actual license amendment fee.

This should allow the action to move forward. If I can be of further assistance do not hesitate to call me at 314-479-4499.

Regards,

THE CARONDELET CORPORATION

Richard Huber
Quality Assurance and Radiation Safety Coordinator

cks

RECEIVED
DEC 02 1996
REGION III

Pm: 11-27-96

302071



THE CARONDELET CORPORATION

8600 COMMERCIAL BLVD.

4-98
810

Pevely, MO 63070 11-27-96 19 NO. -20203

PAY \$30.000

\$ 30.00

TO THE
ORDER
OF

UNITED STATES NUCLEAR REG COMMISSION
801 WARRENVILLE ROAD
LISLE, IL 60532-4351

THE CARONDELET CORPORATION - REGULAR A/C

[Signature]

[Signature]

302071



SOUTHWEST BANK
ST. LOUIS, MISSOURI

⑆08⑆0⑆0098⑆ ⑆0⑆ ⑆6⑆ 9⑆