

## MATERIALS LICENSE

Amendment No. 13

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.

397905

Licensee		In accordance with application dated November 22, 1994	
1. Crane Army Ammunition Activity		3. License Number 13-18235-01 is renewed in its entirety to read as follows:	
2. ATTN: SMCCN-SF 300 Hwy. 361 Crane, IN 47522-5099		4. Expiration Date October 31, 2001	
		5. Docket or Reference No. 030-14708	
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. Cobalt-60	A. Sealed sources (Advanced Medical Systems Model AMS 3800)	A. One source not to exceed 2,000 curies	
B. Uranium depleted in uranium-235	B. Solid metal	B. 999 kilograms total	
9. Authorized Use:			
A. For use in Picker Cyclops Model 590 exposure device for industrial radiography.			
B. For shielding in radiographic exposure devices and source changers.			

CONDITIONS

10. Licensed material shall be used only at the licensee's facilities located at Crane Army Ammunition Activity, Building 104, 300 Hwy. 361, Crane, Indiana.
11. A. The Radiation Safety Officer for this license is Walter F. Shearin
- B. The Alternate Radiation Safety Officers for the this license are Robert D. Roach and Richard W. Murphy.

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PDR ADDCK 03014708  
B PDR

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**MATERIALS LICENSE  
SUPPLEMENTARY SHEET**

License Number

13-18235-01

Docket or Reference Number

030-14708

Amendment No. 13

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 application dated November 22, 1994 and letters dated September 5, 1996 and September 16, 1996 and have been approved in writing by the Radiation Safety Officer.
13. 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.
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 shall maintain records of information important to safe and effective decommissioning at the address specified in Condition 10, per the provisions of 10 CFR 30.35(g) until this license is terminated by the Commission.
17. Notwithstanding the requirements of 10 CFR 34.20(a) and (e), and pursuant to 10 CFR 34.51, the licensee may use its Model 590 exposure device as described in letter dated January 9, 1996.

COPY

**MATERIALS LICENSE  
SUPPLEMENTARY SHEET**

License Number

13-18235-01

Docket or Reference Number

030-14708

Amendment No. 13

18. 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 U.S. 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. Application dated November 22, 1994 (excluding request for William Patterson as an individual responsible for day-to-day management or supervision of the radiation safety program); and
  - B. Letters dated January 9, 1996, September 5, 1996 (excluding requests for Robert Gillis as Alternate Radiation Safety Officer and William Patterson as an individual responsible for day-to-day management or supervision of the radiation safety program), and September 16, 1996.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Date 10/18/96

By Robert D. Gattone Jr.  
Nuclear Materials Licensing Branch, Region III

**COPY**

BETWEEN:

(FOR LFMS USE)  
INFORMATION FROM LTS

LICENSE FEE MANAGEMENT BRANCH  
AND  
REGIONAL LICENSING SECTION

PROGRAM CODE: 03310  
STATUS CODE: 2  
FEE CATEGORY: EX 30  
EXP. DATE: 19950331  
FEE COMMENTS: V  
DECOM FIN ASSUR REQD: N

LICENSE FEE TRANSMITTAL

A. REGION

1. APPLICATION ATTACHED  
APPLICANT/LICENSEE: ARMY, DEPARTMENT OF THE  
RECEIVED DATE: 941205  
DOCKET NO: 3014708  
CONTROL NO: 397905  
LICENSE NO: 13-18235-01  
ACTION TYPE: RENEWAL

2. FEE ATTACHED  
AMOUNT: 800.00  
CHECK NO: 3585-80017390

3. COMMENTS

SIGNED  
DATE

*D. Hershey*  
12/13/94

B. LICENSE FEE MANAGEMENT BRANCH (CHECK WHEN MILESTONE 00 IS ENTERED / /)

1. FEE CATEGORY AND AMOUNT: 3020 170.11(a)(5)

2. CORRECT FEE PAID. APPLICATION MAY BE PROCESSED FOR:  
AMENDMENT  
RENEWAL ☒  
LICENSE

3. OTHER

SIGNED  
DATE

*Sc*  
12/13/94

RECEIVED  
JAN 23 1995  
REGION III



NRC FORM 313

(6-93)

10 CFR 30, 32, 33  
34, 35, 36, 39 and 40

## U. S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0120

EXPIRES 6-30-96

## APPLICATION FOR MATERIAL LICENSE

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 9 HOURS. SUBMITTAL OF THE APPLICATION IS NECESSARY TO DETERMINE THAT THE APPLICANT IS QUALIFIED AND THAT ADEQUATE PROCEDURES EXIST TO PROTECT THE PUBLIC HEALTH AND SAFETY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0120), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

INSTRUCTIONS: SEE THE APPROPRIATE LICENSE APPLICATION GUIDE FOR DETAILED INSTRUCTIONS FOR COMPLETING APPLICATION. SEND TWO COPIES OF THE ENTIRE COMPLETED APPLICATION TO THE NRC OFFICE SPECIFIED BELOW.

## APPLICATION FOR DISTRIBUTION OF EXEMPT PRODUCTS FILE APPLICATIONS WITH:

DIVISION OF INDUSTRIAL AND MEDICAL NUCLEAR SAFETY  
OFFICE OF NUCLEAR MATERIALS SAFETY AND SAFEGUARDS  
U.S. NUCLEAR REGULATORY COMMISSION  
WASHINGTON, DC 20555-0001

ALL OTHER PERSONS FILE APPLICATIONS AS FOLLOWS:

## IF YOU ARE LOCATED IN:

CONNECTICUT, DELAWARE, DISTRICT OF COLUMBIA, MAINE, MARYLAND,  
MASSACHUSETTS, NEW HAMPSHIRE, NEW JERSEY, NEW YORK, PENNSYLVANIA,  
RHODE ISLAND, OR VERMONT, SEND APPLICATIONS TO:

LICENSING ASSISTANT SECTION  
NUCLEAR MATERIALS SAFETY BRANCH  
U.S. NUCLEAR REGULATORY COMMISSION, REGION I  
475 ALLENDALE ROAD  
KING OF PRUSSIA, PA 19406-1415

ALABAMA, FLORIDA, GEORGIA, KENTUCKY, MISSISSIPPI, NORTH CAROLINA, PUERTO  
RICO, SOUTH CAROLINA, TENNESSEE, VIRGINIA, VIRGIN ISLANDS, OR WEST VIRGINIA,  
SEND APPLICATIONS TO:

NUCLEAR MATERIALS LICENSING SECTION  
U.S. NUCLEAR REGULATORY COMMISSION, REGION II  
101 MARIETTA STREET, NW, SUITE 2900  
ATLANTA, GA 30323-0199

## IF YOU ARE LOCATED IN:

ILLINOIS, INDIANA, IOWA, MICHIGAN, MINNESOTA, MISSOURI, OHIO, OR WISCONSIN,  
SEND APPLICATIONS TO:

MATERIALS LICENSING SECTION  
U.S. NUCLEAR REGULATORY COMMISSION, REGION III  
799 ROOSEVELT ROAD  
GLEN ELLYN, IL 60137-5927

ARKANSAS, COLORADO, IDAHO, KANSAS, LOUISIANA, MONTANA, NEBRASKA, NEW  
MEXICO, NORTH DAKOTA, OKLAHOMA, SOUTH DAKOTA, TEXAS, UTAH, OR WYOMING,  
SEND APPLICATIONS TO:

NUCLEAR MATERIALS LICENSING SECTION  
U.S. NUCLEAR REGULATORY COMMISSION, REGION IV  
611 RYAN PLAZA DRIVE, SUITE 400  
ARLINGTON, TX 76011-8064

ALASKA, ARIZONA, CALIFORNIA, HAWAII, NEVADA, OREGON, WASHINGTON, AND U.S.  
TERRITORIES AND POSSESSIONS IN THE PACIFIC, SEND APPLICATIONS TO:

RADIOACTIVE MATERIALS SAFETY BRANCH  
U.S. NUCLEAR REGULATORY COMMISSION, REGION V  
1450 MARIA LANE  
WALNUT CREEK, CA 94596-5368

PERSONS LOCATED IN AGREEMENT STATES SEND APPLICATIONS TO THE U.S. NUCLEAR REGULATORY COMMISSION ONLY IF THEY WISH TO POSSESS AND USE LICENSED MATERIAL IN STATES SUBJECT TO U.S. NUCLEAR REGULATORY COMMISSION JURISDICTIONS.

## 1. THIS IS AN APPLICATION FOR (Check appropriate item):

- ☐ A. NEW LICENSE  
☐ B. AMENDMENT TO LICENSE NUMBER \_\_\_\_\_  
☒ C. RENEWAL OF LICENSE NUMBER 13-18235-01

## 2. NAME AND MAILING ADDRESS OF APPLICANT (Include Zip code)

Commander  
Crane Army Ammunition Activity  
ATTN: SMCCN-SF  
300 HWY 361  
Crane, Indiana 47522-5099

## 3. ADDRESS(ES) WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED

Commander  
Crane Army Ammunition Activity  
Building 104  
300 HWY 361, Crane Indiana, 47522-5099

## 4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

Walter F. Shearin

TELEPHONE NUMBER  
(812) 854-1246/3404

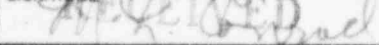
SUBMIT ITEMS 5 THROUGH 11 ON 8-1/2 X 11" PAPER. THE TYPE AND SCOPE OF INFORMATION TO BE PROVIDED IS DESCRIBED IN THE LICENSE APPLICATION GUIDE.

5. RADIOACTIVE MATERIAL a. Element and mass number; b. chemical and/or physical form; and c. maximum amount which will be possessed at any one time.	6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED.
7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING EXPERIENCE.	8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS.
9. FACILITIES AND EQUIPMENT.	10. RADIATION SAFETY PROGRAM.
11. WASTE MANAGEMENT.	12. LICENSEE FEES (See 10 CFR 170 and Section 170.31) FEE CATEGORY <u>1C</u> AMOUNT ENCLOSED <u>\$800.00</u>
13. CERTIFICATION. (Must be completed by applicant) THE APPLICANT UNDERSTANDS THAT ALL STATEMENTS AND REPRESENTATIONS MADE IN THIS APPLICATION ARE BINDING UPON THE APPLICANT. THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATION ON BEHALF OF THE APPLICANT, NAMED IN ITEM 2, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PARTS 30, 32, 33, 34, 35, 36, 39 AND 40, AND THAT ALL INFORMATION CONTAINED HEREIN IS TRUE AND CORRECT TO THE BEST OF THEIR KNOWLEDGE AND BELIEF. WARNING: 18 U.S.C. SECTION 1001 ACT OF JUNE 25, 1948 62 STAT. 749 MAKES IT A CRIMINAL OFFENSE TO MAKE A WILLFULLY FALSE STATEMENT OR REPRESENTATION TO ANY DEPARTMENT OR AGENCY OF THE UNITED STATES AS TO ANY MATTER WITHIN ITS JURISDICTION.	

CERTIFYING OFFICER - TYPED/PRINTED NAME AND TITLE

Michael L. Conrad, LTC, OD, Commanding

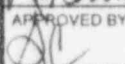
SIGNATURE



DATE

22 Nov 94

## FOR NRC USE ONLY

TYPE OF FEE <u>Renewal</u>	FEE LOG <u>Dec 4</u>	FEE CATEGORY <u>EX 302A</u>	AMOUNT RECEIVED <u>\$800.00</u>	CHECK NUMBER <u>5585-8007390</u>	COMMENTS <u>REGION I</u>
APPROVED BY 				DATE <u>12/13/94</u>	<b>FEE EXEMPT</b> <u>397905</u>



DEPARTMENT OF THE ARMY  
CRANE ARMY AMMUNITION ACTIVITY  
300 HIGHWAY 361  
CRANE INDIANA 47522-5099



REPLY TO  
ATTENTION OF

November 30, 1994

Safety Office

Materials Licensing Section  
U.S. Nuclear Regulatory Commission, Region III  
799 Roosevelt Road  
Glen Ellyn, IL 60137-5927

Dear Sir,

Enclosed is the application for renewal of Crane Army Ammunition Activity's License number 13-18235-01. This license expires on 31 March 1995.

If additional information is needed, please contact the undersigned, at (812) 854-1246.

Sincerely,

*Walter F. Shearin*  
Walter F. Shearin  
Chief, Safety Office

Enclosure

Copy Furnished:

U.S. Army Materiel Command ATTN: AMCSF, 5001 Eisenhower Avenue,  
Alexandria, VA 22333-0001

U.S. Army Armament, Munitions, and Chemical Command,  
ATTN: AMSMC-SFS, Rock Island, IL 61299-6000

RECEIVED

DEC 05 1994

REGION III

397905

**VOUCHER FOR TRANSFERS  
BETWEEN APPROPRIATIONS AND/OR FUNDS**

VOUCHER NO.

700006

SCHEDULE NO.

Department, establishment, bureau, or office receiving funds

U.S. NUCLEAR REGULATORY COMMISSION

BILL NO.

Department, establishment, bureau, or office charged

- DEPARTMENT OF THE ARMY  
CRANE ARMY AMMUNITION ACTIVITY  
CODE: DFAS-IN/EM-BD  
CRANE, IN 47522-5099

PAID BY

NOV 29 1994

SYMBOL 5585

CRANE ARMY AMMUNITION ACTIVITY

ORDER NO.	DATE OF DELIVERY	ARTICLE OR SERVICES	QUANTITY	UNIT PRICE		AMOUNT
				COST	PER	DOLLARS AND CENTS
		Renewal of License Number 13-18235-01				\$800.00
TOTAL						

Remittance in payment hereof should be sent to--

U.S. NUCLEAR REGULATORY COMMISSION  
LICENSE FEE & DEBT COLLECTION BRANCH  
P.O. BOX 954514  
ST. LOUIS, MO 63195-4514

ACCOUNTING CLASSIFICATION—Office Receiving Funds

\$800.00

**CERTIFICATE OF OFFICE CHARGED**

I certify that the above articles were received and accepted or the services performed as stated and should be charged to the appropriation(s) and/or fund(s) as indicated below; or that the advance payment requested is approved and should be paid as indicated.

*Cynthia M. Beck*  
Cynthia M. Beck

(Authorized administrative or certifying officer)

29 Nov 94

(Date)

Certifying Officer

(Title)

ACCOUNTING CLASSIFICATION—Office Charged

97X4930.AA3A

S12126

55NC00 04000

2572

\$800.00

Paid by Check No. 80017390

RECORD OF ENVIRONMENTAL CONSIDERATION

To: Stephen M. Schick, Environmental Protection Specialist, Crane Army Ammunition Activity (CAAA)

From: Walter F. Shearin, Radiation Protection Officer, Crane Army Ammunition Activity

Project Title: Renewal of Nuclear Regulatory Commission License  
No. 13-18234-01

Brief description: This license is used to authorize the continued use of a sealed Cobalt-60 source in a permanent radiography facility at building 104. This facility is used to radiograph ammunition components and items and any other items necessary for efficient operation of CAAA.

Reason for using a record of environmental consideration--

This project is categorically excluded under the provisions of CX A-11, AR 200-2, appendix A, (and no extraordinary circumstances exist as defined in paragraph 4-2), because:

1. Operations conducted by this established laboratory is within an enclosed facility and has external radiation levels that are in compliance with existing Federal, State, local laws, and regulations.
2. No environmentally controversial change is being made to existing environmental conditions.
3. This action has been evaluated IAW AR 200-2, appendix A, paragraph A-31, and all requirements for Categorical Exclusions are true.

17 Nov 94

Date

Walter F. Shearin

WALTER F. SHEARIN  
Radiation Protection Officer

17 Nov 94

Date

Stephen M. Schick

STEPHEN M. SCHICK  
Environmental Coordinator



NRC Form 313 (6-93)  
Application for Material License (Renewal)  
License No. 13-18235-01  
Crane Army Ammunition Activity  
Crane, IN 47522-5099

Item # 5 Radioactive Material

Source:

Element	Model Number	Manufacturer	Maximum Activity
Cobalt-60 Sealed Source	AMS 3800	Advanced Medical Systems	2000 Curies

✓ Depleted Uranium in source  
exposure device for shielding 20 kilograms

Source Exposure Device:

Model Number	Manufacturer
590	Picker X-ray Corporation

Note 1: The Technical Operations, Inc., Model 520, and Technical Operations, Inc. Source number TO-A-453-6, listed on previous versions of this license, were transferred to J.L. Shepherd and Associates, 1010 Arroyo Ave., San Fernando, CA. A copy of the transfer paperwork is enclosed in Appendix A.

Note 2: The radiographic exposure device will have attached to it a durable, legible, clearly visible label bearing: Chemical symbol and mass number of the radionuclide in the device, activity and date on which this activity was last measured, model number and serial number of the sealed source, manufacturer of sealed source, and licensee's name, address, and telephone number.

Note 3: The radiographic exposure device and associated equipment meets the requirements specified in the American National Standard N432-1980.

NRC Form 313 (6-93)  
Application for Material License (Renewal)  
License No. 13-18235-01  
Crane Army Ammunition Activity  
Crane, IN 47522-5099

Item #6 Purpose for which Licensed Material will be used:

The Cobalt-60 sealed source will be used in a Picker-Cyclops, Model 590, radiographic exposure device in a permanent facility for industrial radiography. This exposure device has an electrical-mechanical drum that rotates to expose the source for radiography. At no time is the source projected from the center of the exposure device. In the event of a loss of electrical power, the system is designed to automatically return to a safe position. In the event the electrical-mechanical control fails, the "eye" of the device can be manually closed from the top of the device by rotating the drum. The maximum exposure for personnel performing this operation is 50 mr/hour.

NRC Form 313 (6-93)  
Application for Material License (Renewal)  
License No. 13-18235-01  
Crane Army Ammunition Activity  
Crane, IN 47522-5099

Item #7 Individuals Responsible for the Radiation Safety Program and their Training Experience:

Overall Organizational Structure:

The Co-60 source will be operated by trained radiographers in the Industrial Operations Directorate, Quality and Procedures Division. (See pertinent portion of Activity Organization Chart in Appendix B).

Radiation Safety Oversight will be provided by the Radiation Protection Officer (RPO), Mr. Walter F. Shearin, who is presently Chief of the Safety Office and answers directly to the Commander of CAAA. The RPO will be responsible for the overall health physics portion of the radiography program and specifically, will:

1. Maintain control of by-product material.
2. Establish and maintain the leak test program and records for this program.
3. Assist with source replacement and tagging operations.
4. Assume control and institute corrective action in emergency situations.
5. Investigate accidents and determine preventative measures.
6. Make periodic inspections and checks to determine that all safety precautions are being followed.
7. Act in an advisory capacity to licensee's management and radiographic personnel and act as a liaison with the NRC.
8. Have authority and responsibility to immediately stop any radiographic operation/personnel performing radiography, if safety of the operation is in question.

The present radiographers, Mr. Richard W. Murphy and Mr. Robert D. Roach, will be responsible for day-to-day operations of the facility. They will also serve as co-alternate RPOs. They will be supervised by Mr. Ronald F. Tarr, Chief of Production Inspection. Mr. Tarr will ensure internal controls are maintained and ensure compliance with regulations.

NRC Form 313 (6-93)  
Application for Material License (Renewal)  
License No. 13-18235-01  
Crane Army Ammunition Activity  
Crane, IN 47522-5099

Item #7 Individuals Responsible for the Radiation Safety Program  
and Their Training Experience: (Continued)

The competency of the radiographer, with respect to non-destructive testing, will be determined by a certified level II or III radiographer IAW Army regulations. The RPO will certify that the radiographer has been trained in accordance with Title 10 CFR, Parts 19, 20, 21, and 34.

The specific training and experience of each individual mentioned in this item has been provided in Appendix C.

A qualified/certified radiographer is responsible for the day-to-day activities of the radiography facility. No radiography will be conducted without a qualified/certified radiographer present.



NRC Form 313 (6-93)  
Application for Material License (Renewal)  
License No. 13-18235-01  
Crane Army Ammunition Activity  
Crane, IN 47522-5099

Item # 8 Training for Individuals Working in or Frequenting  
Restricted Areas:

I. REQUEST FOR ADDITIONAL RADIOGRAPHER (INITIAL RADIOGRAPHER  
TRAINING)

Request will be initiated by the Chief of the Quality and Procedures Division. The request form (see Appendix D) is also a checklist which will document the radiographer's training progress in becoming a qualified radiographer. Copies of the trainee exams and evaluations will be maintained, as required, to verify their performance.

A minimum of 40 hours of formal training and three months full time equivalent of on-the-job training, will be required before a radiographer can be qualified/certified. All training will be in accordance with applicable Army regulations and requirements.

Radiographers trained after 31 March 1995 will receive 40 hours of Safety Training. This training will cover the following subjects:

a. Fundamentals of Radiation Safety--

- (1) Characteristics of gamma radiation.
- (2) Units of radiation dose and quantity of radioactivity.
- (3) Hazards of exposure to radiation.
- (4) Levels of radiation from licensed material.
- (5) Methods of controlling radiation dose i.e., time, distance, and shielding.

b. Radiation Detection Instruments--

- (1) Use, operation, calibration, and limitations of radiation survey instruments.
- (2) Survey techniques.
- (3) Use of personnel monitoring equipment.

NRC Form 313 (6-93)  
Application for Material License (Renewal)  
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Item #8 Training for Individuals Working in or Frequenting  
Restricted Areas: (Continued)

c. Equipment to be used--

- (1) Operation and control of radiographic equipment and storage containers, including pictures, models, or storage assemblies.
- (2) Storage, control, and disposal of licensed material.
- (3) Maintenance of equipment.

d. The requirements of pertinent Federal and Army regulations.

e. Case histories of accidents in radiography.

The above training shall be conducted by the RPO or a designated representative. In addition, Radiographers will take and pass a written Safety Certification Examination from an approved certifying agency (i.e., ASNT) within two years after final publication of NRC Proposed rule change, for parts 34 and 150, published in the Federal Register on 28 Feb 94.

II. PRELIMINARY INSTRUCTION (INITIAL TRAINING)

It is estimated this instruction will require approximately three hours of classroom time. Instruction will be conducted by the RPO, alternate RPO, or a qualified radiographer. The Radiographer Trainee will receive the following training before he is permitted to receive on-the-job training. He will also receive copies or have access to the following documents at this time.

Title 10 CFR, Parts 19, 20, 21, and 34  
NRC License  
CAAA-R 385-7 (Appendix F)

NRC Form 313 (6-93)  
Application for Material License (Renewal)  
License No. 13-18235-01  
Crane Army Ammunition Activity  
Crane, IN 47522-5099

Item #8 Training for Individuals Working in or Frequenting  
Restricted Areas (Continued)

a. Training--

- (1) Radiation Protection Program.
  - (a) Regulation 10 CFR, Part 20.
  - (b) Adherence to regulations.
- (2) Operating instructions.
  - (a) Who is authorized to operate equipment?
  - (b) Requirement for usage of instruments.
  - (c) Specific instructions at operating sites.
- (3) Application of film badges.
  - (a) Type and use.
  - (b) Care.
  - (c) Requirements (who is to wear them and records).
- (4) Use of pocket dosimeter.
  - (a) Type and care.
  - (b) Records.
- (5) Instrument operation.
  - (a) Type and use.
  - (b) Care.
  - (c) Operation.
  - (d) Calibration.
- (6) Posting requirements.

NRC Form 313 (6-93)  
Application for Material License (Renewal)  
License No. 13-18235-01  
Crane Army Ammunition Activity  
Crane, IN 47522-5099

Item #8 Training for Individuals Working in or Frequenting  
Restricted Areas (Continued)

(a) Required posting for radiation areas and high radiation areas.

(b) Who will post the signs?

(7) Radiation surveys.

(a) Why they are required (purpose)?

(b) How to make a survey.

(8) Maintenance and inspection.

(a) Inspection requirements and frequency.

(b) Maintenance requirements and frequency.

(c) Checklist.

(9) Emergency procedures.

(a) Emergency in vicinity of source.

(b) What action to be taken.

(c) What to do with source.

(10) Emergency involving an explosion.

(a) Possible situations and actions to be taken.

(b) Possible effects of explosion on source and radiation hazards.

(11) Malfunction of Source Projector

(a) Possible malfunctions.

(b) Action to be taken.

(c) Avoidance of radiation exposure.



NRC Form 313 (6-93)  
Application for Material License (Renewal)  
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Item #8 Training for Individuals Working in or Frequenting  
Restricted Areas (Continued)

(12) Accidental Personnel Exposure.  
Action to be taken.

(13) Leaking Source.

(a) Structure and construction of source and capsule.

(b) Consequences of damage.

(c) Action to be taken.

(14) Emergency notification procedure.

b. Tour and Field Test--

This phase will require about two hours and will be taught by the RPO or alternate RPO or by a qualified Radiographer.

(1) Source radiography.

(a) How it differs from machine-generated radiation.

(b) Special hazards.

(2) Radiation Protection  
Shielding.

(3) Layout of radiographic facilities.

(4) Interlock Systems.

(5) Source Projector Operation.

(6) Securing the projector.

c. Trainee Test--

(1) A test will be given at the close of the session (Radiographer Test, Appendix E). A grade of 60 percent is required before advancing to the next step in training. All questions missed on test will be reviewed for proper understanding.

NRC Form 313 (6-93)  
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(2) Upon completion of Radiographer test, a person will be qualified as a radiographer assistant.

d. On-the-job Observation and Training--

(1) The radiographer's assistant will work with a qualified radiographer, at a radiographic site, before he goes to a qualified radiographer's training course.

(2) The qualified radiographer shall certify that the radiographer's assistant has reviewed and used the following:

- (a) Operating and emergency procedures.
- (b) Safety devices (such as interlocks).
- (c) Personal monitors and dosimetry.
- (d) Survey meters.
- (e) Log books.
- (f) Mechanical check records.

(3) Each radiographer's assistant will receive Operator training/instruction from qualified schools in radiography.

(4) Upon the return of the radiographer's assistant from the qualified school (level 1 or Level 2), a copy of his certificate of completion will be maintained by the Chief of Quality and Procedures Division and at Civilian Personnel. Tracking of on-the-job training hours may be maintained at the radiography facility, but is the responsibility of the Chief of Quality Control Division. A radiographer's assistant must be supervised by a qualified radiographer during all radiography operations. A qualified radiographer must certify that a radiographer's assistant is qualified to become a radiographer.

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e. Radiographer's Qualification Exam--

The RPO, alternate RPO, or other qualified radiographer checks the proposed radiographer competency in actual practice. The following is a summary of the information used to determine an individual's competency to act as a radiographer:

- (1) Knowledge of and competency in actual operations of exposure equipment and survey instruments.
- (2) Knowledge of operational and safety systems in the operation.
- (3) Knowledge of SOP with special emphasis on emergency procedures and ability to operate exposure and accessory equipment in accordance with the SOP, as well as knowledge of proper survey procedures.
- (4) Knowledge of applicable NRC regulations. The above is accomplished by oral questions, actual observations and a written test (Appendix E). If he does prove his competency to both and received a test score of at least 80, he is then approved as a radiographer.

f. Radiographer's Performance Check--

A checklist is available to assure that items of importance are not overlooked when checking the competency of a radiographer. This list will be used should any new radiographer be trained.

- (1) Proper operations of survey instrument.
- (2) Posted signs as required.
- (3) Proper use of dosimetry devices.
- (4) Observe the instrument upon entrance to the exposure bay.
- (5) Check guide tube and source projector.
- (6) Perform the maintenance check as required.

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- (7) Lock the bay as required.
- (8) Survey the outside of the exposure bay.
- (9) Fill out the log book.
- (10) Follow the SOP.
- (11) Questions asked during and after the above (oral).
  - (a) What would happen if the instrument was out of calibration?
  - (b) How often are instruments calibrated?
  - (c) Who does it?
  - (d) Why wear both a dosimeter and TLD?
  - (e) Where in the procedure does it say to wear both?
  - (f) What approximate reading should you get when opening the vault door with the source put away?
  - (g) How often is a maintenance check made by the radiographer?
  - (h) Do you lock the vault?
  - (i) Why, if it is interlocked?
  - (j) What would you do if the indicating light did not operate as required?
  - (k) What level of exposure should we get on the outside of the vault?
  - (l) How often are the log books filled out? How many log books are required?
  - (m) If the source could not be returned to shielded position what would you do?



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(n) Who is the Radiation Protection Officer?

(o) If you could not get the vault locked at the end of the shift, what would you do?

(p) If maintenance came down to work on the vault ring would you let him in without a safety work permit?

g. Radiographer and Radiographer's Assistant Annual Training--

Annual training will be accomplished by the Radiation Protection Officer, Alternate Radiation Protection Officer, or a qualified Radiographer. Training will cover, but will not be limited to, the following:

(1) Changes to Title 10 that are pertinent to radiographic operations.

(2) Review of accidents that have been reported to occur in the radiographic industry.

(3) Review of Operating and Emergency Procedures and License amendments.

(4) A review of radiation exposures information involving the operation.

h. Radiographer quarterly inspection program--

On a quarterly basis the RPO will test and observe the performance of each radiographer and radiographer's assistant during an actual radiographic operation IAW 10 CFR 34.11. If a Radiographer or a Radiographer's assistant has not participated in a radiographic operation for more than three months since the last inspection, that individual's performance must be observed by the RPO and/or the assistant RPO and recorded the next time the individual participates in a radiographic operation. Inspection records on the performance of radiographers and radiographers' assistants will be retained in files for not less than three years.

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Routine quarterly inspections will be maintained on file by the RPO. Non-routine quarterly inspections will be maintained on file at the radiography facility building 104.

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Item #9 - Facilities and Equipment

Building 104

The Crane Army Ammunition Activity radiographic (isotope) facility, located at Crane Division, Naval Surface Warfare Center, Crane, Indiana is shown in Figure 1. It is an enclosed permanent radiographic facility as described in National Bureau of Standards (NBS) Handbook 114. The wall in the direction of exposure is reinforced concrete, supplemented by solid concrete block to a thickness of four feet. Additional shielding is provided by the double rows of 3" x 3" x 12" lead brick outlining the periphery of the focal tunnel, the height of the concrete walls is six feet six inches, covered by a roof consisting of one-half inch solid steel plate plus two feet of solid concrete block. The rear of the facility is protected by a barbed wire topped chain link fence which bears the NRC radiation caution symbol and warning "CAUTION - RADIATION AREA" on its gate and at various locations along the fence. There is no access to the exposure room from this outside area. The entire facility itself is located within an existing operating building with only controlled internal access to the exposure room being permitted.

Access to the exposure room can be gained only through the entrances on the east and west sides of the facility. The entrances are sealed by seven-foot high wire gates interlocked with the control console so that radiographic operations will be ceased and the source returned to a safe position should either door be inadvertently opened during radiographic operations. The locks on the doors are opened with the same key that activates the control console. The doors are posted with the radiation caution symbol and words "CAUTION - RADIATION AREA". The radiation caution symbol and words "CAUTION - HIGH RADIATION AREA" are posted conspicuously on the outside walls of the tunnels leading to the exposure chamber.

Constant surveillance of the exposure room entrance is maintained during radioisotope radiography to ensure that no person enters the high radiation area. The access to the exposure room is secured by combination padlock during non-operating hours.

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Item #9 Facilities and Equipment (Continued)

The visual alarm shown in figure 1 is set to 2 mr/hr activation which operates rotating red lights on the interior and exterior of the facility as shown in Figure 1. Operators are located in the control room north of and adjacent to the exposure room in the area where the control console (denoted by letters C.C.) is located, as shown in Figure 1. Operators are in this area at all times when operating the source projectors. The level of radiation in the control room area is less than 2 mr/hr and is held at the same level or less on the outside savored of the facility.

The following engineering drawings for this facility is attached at end of this license, Appendix G.

CAAA Dwg. No. 2496, "2000 Curie Cobalt 60, Bldg. 104"

CAAA Dwg. No. 3348, "Alterations to Center Wing for 2000 Curie Cobalt 60, Ref. Bldg. 104"

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Item # 10 - Radiation Safety Program

10.1 Radiation Detection Instrumentation

1. Radiation survey instruments (RADIACS) which accurately measure x-ray and gamma radiation levels ranging from .1 mr/hr to 2.0 R/hr are used in conjunction with all Crane Army Ammunition Activity operations which involve the exposure, replacement or transport of a sealed source.

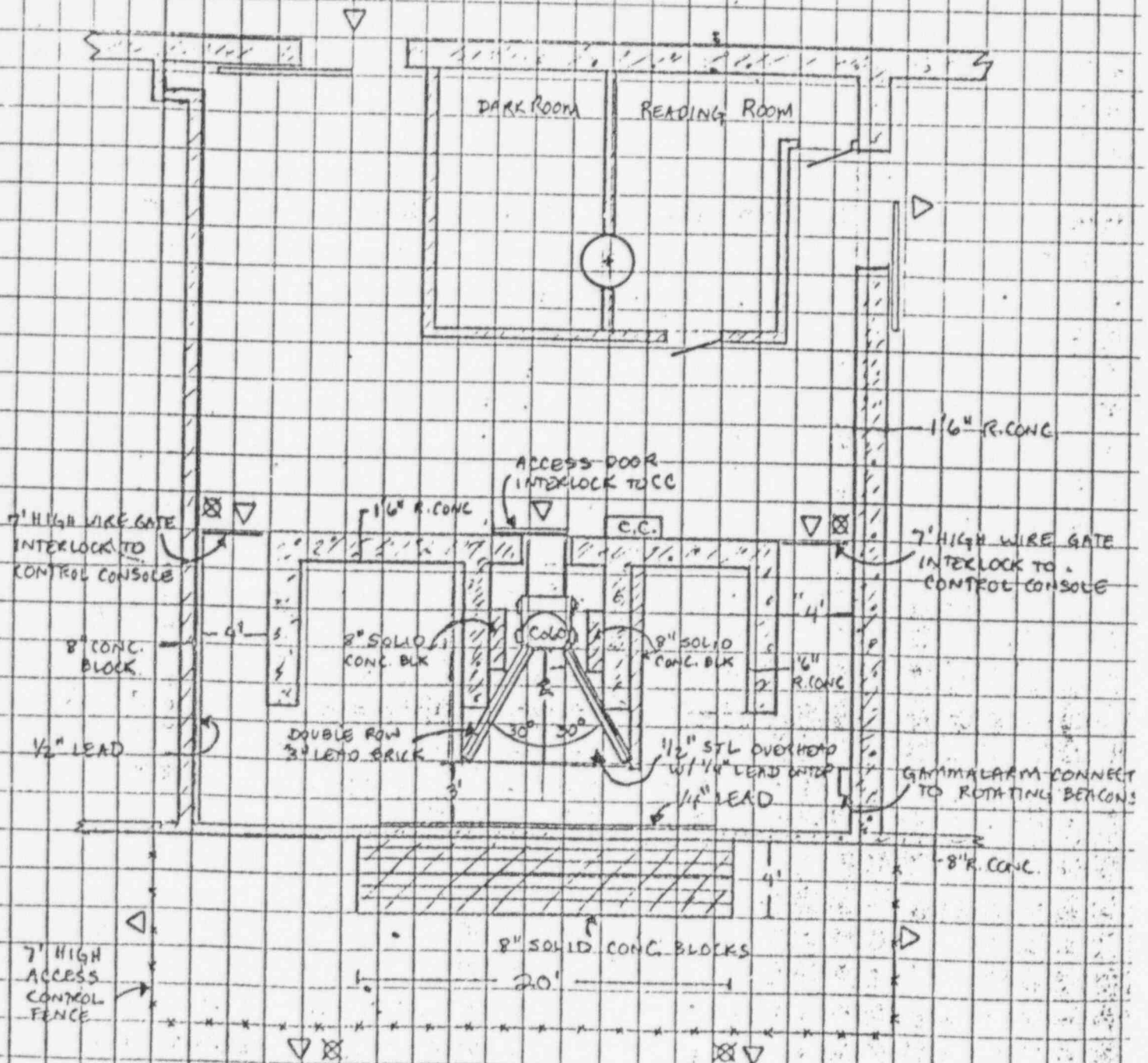
2. Several Eberline Model E-520 or equivalent radiacs are stored in the Radiography Facility. Posted operating procedures contain detailed instructions for the operation of the equipment. Radiacs used are those approved by the U.S. Army Ionizing Radiation Dosimetry Center (AIRDC) at Lexington Army Depot which from time to time deletes sub-types and adds newer improved models to the list.

FIGURE 1  
RADIOISOTOPE FACILITY  
BLDG 104  
C A A A

⊗ - ROTATING BEACONS

▽ - RADIATION WARNING SIGNS

SCALE 1/8" = 1' 0"





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10.2 Instrument Calibration Procedures

1. The Eberline E-520 instruments are calibrated and/or repaired every three months by a licensed vendor. The meters are labeled showing date of calibration and next due date.
2. Current vendor of services to include calibration, maintenance and repair is Stan A. Huber Consultants, INC. Their License is Illinois License # IL-01013-01, (see Appendix H). Their address is 200 North Cedar Road, New Lenox IL. 60451. Telephone # is (815)-485-6161.
3. If vendor is changed we will insure they have a valid NRC license.
4. Calibration records shall be retained for a minimum of 3-years after each calibration.

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Item #10 - Radiation Safety Program

10.3 - Personnel Monitoring Equipment

1. Thermoluminescent Dosimeters (TLD's)

a. The TLD's provided by the U.S. Army Ionizing Radiation Dosimetry Center (AIRDC), Lexington Bluegrass Depot Activity, Lexington Kentucky, are issued quarterly to radiographer and radiographer's assistants. Employees assigned to radiographic work will wear two pocket dosimeters and a TLD.

b. A TLD bears the name of the employee to whom it is assigned. A personnel TLD may only be worn by the employee to whom it is assigned. The control badges, which are placed on the personnel badge racks to ascertain radiation dosage at the racks, are never to be worn by personnel.

c. Crane Army Ammunition Activity (CAAA) will use the U.S. Army Ionizing Radiation Dosimetry Program (AIRDC) services for processing TLD's and maintaining employee files of radiation dosage. The TLD's are delivered to the Naval Surface Warfare Center (NSWC) Radiation Health Officer quarterly. In the event of an incident, the employee's TLD will be submitted immediately. The Army is now using the Central Dosimetry Record Repository (CDRR) and two copies of the Automated Dosimetry Report (ADR) is sent every quarter, one is signed by the RPO and placed in the employees' medical record and the other is given to the employee for his records. The computer forms are reviewed by the RPO on a quarterly basis.

d. See CAAA regulation 385-7, Appendix F for proper use and care of TLD's.

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### 10.3 Personnel Monitoring Equipment (Continued)

#### 2. Dosimeters

a. Dosimeters which provide direct readings of cumulative radiation dosage from 0-200 mr are provided. One TLD and two dosimeters or one electronic type direct reading dosimeter must be worn by all radiation personnel associated with any operation involving the exposure, handling, transport, or replacement of a sealed source. Dosimeters are to be read often during such operations by the individuals wearing them, but should not be handled excessively. Pocket dosimeters shall be calibrated at least annually. Dosimeters used are of various brands, such as Victoreen, Bendix, Nuclear Chicago, or Dosimeter Corporation, but all have the specification adherence as noted above. The Navy Pocket Dosimeter (IM235PD X-ray Low Range Dosimeter) is currently being used. It is for X-ray and Gamma Radiation.

b. Personnel will ensure that dosimeters are adequately charged at the beginning of each shift during which radioisotope operations are to be conducted. The individual is responsible for charging the dosimeters, and records the initial and terminal dosimeter readings for each day. The charger used is a Type PP-4276C/PD or equivalent commercial model.

c. Electronic type dosimeters shall have at least a range of 200 mr available prior to start of each shift.

d. See CAAA regulation 385-7, Appendix F, for action to take should a dosimeter be found off-scale or with a reading of more than 10 mrem.

#### 3. Maintenance

The CAAA does not propose to perform any maintenance to the equipment or the source. Periodic maintenance (quarterly) will be performed by a contractor licensed by the NRC to perform these services. Leak tests will be conducted at each scheduled maintenance. Copies of leak test results and maintenance reports will be maintained by the Quality Control Division and the RPO. Maintenance that must be performed in a radiation controlled area will be cleared with the RPO, the Radiographer in charge, and the area supervisor prior to initiation.

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10.3 Personnel Monitoring Equipment (Continued)

4. Transporting Radioactive Material

The CAAA does not propose to transport any radioactive material. Exchange of sources will be contracted to a contractor licensed by the NRC to provide this service.

5. Operating Personnel

The radiographer in charge is responsible for the day-to-day activities of the radiography facility. No radiography will be conducted without a qualified radiographer (see item #8) present. A radiographer will also not work alone.

10.3 Personnel monitoring Equipment (Continued)

6. Radiation Physical Examination

All X-ray and isotope radiographer and radiographer assistants will receive periodic physicals. The total effective dose equivalent to individual members of the public from the licensed operation will not exceed 100 mrem in a year. The dose in any unrestricted area from external sources will not exceed 2 mrem in any one hour.

7. Female Radiation Workers

Female radiation workers and their supervisors shall receive training regarding the biological effects and risk to the unborn child resulting from prenatal exposure to ionizing radiation. The dose to an embryo/fetus during the entire pregnancy, due to occupational exposure, of a declared pregnant woman cannot exceed 0.5 rem. A woman of child bearing age, acting as a radiographer or assistants will also receive instructions on the effects of prenatal radiation exposure and the definition of declared pregnant woman. They will be given a copy of the NRC Regulatory Guide 8.13, Instructions Concerning Prenatal Radiation Exposure. If circumstances require that a declared pregnant woman enter a restricted area, the RPO must be notified and the woman must be provided with a TLD to monitor exposure.

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10.3 Personnel Monitoring Equipment (Continued)

8. Leak Testing of Radiographic Exposure Devices Containing Sealed Sources

a. The Radiation Protection Officer ensures that leak tests of all sealed sources are conducted on a semiannual basis. Sealed sources received without certification of a leak test, within the six-month interval preceding receipt, are leak tested prior to being put into service.

b. Leak test will normally be performed by a licensed contractor. When taken locally, leak test swabs are taken by the Chief of the Quality and Procedures Division or Chief of Production Inspection or by a radiographer under direct supervision of one of the above named individuals. This option fills one of the needs for continuous on-the-job training on important items of safety.

c. All leak test records are kept in the office of the Radiation Protection Officer.

d. Any report which indicates more than .005 microcuries in a swab sample results in immediate notification of the NRC Compliance Officer and NRC Directorate of Licensing as well as immediate cessation of use of the suspect equipment, plus corrective action.

e. Leak tests are begun by approaching the exposure device with a radiation survey meter to ensure that the sealed source is in a shielded position within the device. Rubber gloves are worn during the testing to preclude personnel contamination from a leaking source. The leak test samples are collected as follows:

(1) Panoramic Exposure Devices

(a) Source guide tube is disconnected from the exposure device.

(b) Using rubber gloves, each tube is wiped by affixing to a splint an alcohol moistened cotton swab of slightly lesser diameter than that of the tube.

10.3 Personnel Monitoring Equipment (Continued)

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8. Leak Testing of Radiographic Exposure Devices Containing Sealed Sources

After being run through the tube several times, the swabs are sealed within cellophane envelopes marked with the identification of the source unit, person performing wipe, and date. Closure flaps shall not be licked to shut. This process is repeated with dry swabs.

(c) With the device locked, the safety plug is removed and the orifice wiped--first with an alcohol moistened swab, then with a dry one--and the swabs placed in envelopes marked as in (b) above.

(d) The swabs are forwarded to the following laboratory for analyses:

CHIEF  
USAIRDC  
USARMY TMDE ACT.  
ATTN: AMXTM-SR-DN  
LEXINGTON, KY 40511-5102

The DSN is 745-3942 or COMMERCIAL (606) 293-3942

(2) Directional Beam Exposure Devices

(a) All surfaces adjacent to the source's exposed position, including those of collimator, are wiped with an alcohol moistened swab, then with a dry swab. The swabs are placed in individual envelopes which identify the exposure device tested, individual performing the wipes and the date of testing. The exposure device is secured and surveyed in the usual manner subsequent to leak testing.

(b) The swabs are returned to the RPO who in turn forwards them to the laboratory for analyses. See laboratory address above.

9. Personnel Exposure Limits

a. Legal Limit. Whole body exposure limits for a Radiation worker shall not exceed 5.0 rem per year.



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### 10.3 Personnel Monitoring Equipment (Continued)

#### 10. Limited use of Licensed Material

Operators shall not use licensed material in or on human beings or in field applications.

#### 11. Operating Directives

CAAA-R 385-7, Ionizing Radiation Safety, Appendix F.  
10 CFR, Energy: National Bureau of Standards (NBS) Handbook 114,  
General Safety Standard for Installations Using Non-Medical X-ray  
and Sealed Gamma-Ray Sources, Energies up to 10Mev

#### 12. Records

a. Records will be maintained in accordance with AR 385-11  
with AMCCOM Suppl 1 and AR 40-14.

b. Utilization logs shall be retained for at least three  
years from the date of the recorded event for inspection by the NRC  
or Department of the Army

c. Records of inspections, at intervals not to exceed three  
months, and maintenance shall be retained for at least three years.

d. Records of test of alarm system, at intervals not to  
exceed three months, shall be retained for at least three years.

e. Records of pocket dosimeter exposures shall be retained  
for three years after the record is made.

f. Records from the TLD processor shall be retained for at  
least 3 years after the Commission terminates the license.

g. Records of leak test shall be retained for three years.

h. Records of radioactive material transferred back to the  
manufacturer or other licensed firm shall be retained for at least  
three years after transfer.

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### 10.3 Personnel Monitoring Equipment (Continued)

i. Records showing receipt of the by-product material shall be retained as long as the material is possessed and for at least three years following disposal or transfer of the material.

### 13. Posting

a. Current copies of the following documents shall be posted or a notice posted describing the document and stating where it may be examined:

- (1) 10 CFR 19
- (2) 10 CFR 20
- (3) 10 CFR 34
- (4) Operating and Emergency Procedures
- (5) CAAA-R 385-7
- (6) Any Notices of Violation of License Conditions
- (7) Form NRC-3
- (8) NRC License

b. All entrances to a radiation area shall have signs posted showing the radiation symbol and the words "Caution: Entering Radiation Area."

### 14. Inventory

a. Inventory of all radioactive materials to include radioactive sources and industrial X-ray machines will be conducted quarterly by the RPO.

b. The radioactive source will be accounted for during the entire life cycle through the inventory system.

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10.3 Personnel Monitoring Equipment (Continued)

15. Contamination Control

a. Eating, drinking, chewing or smoking shall not be allowed in a potentially contaminated area.

b. Storage of food in a potentially contaminated area shall not be allowed.

c. Eating, drinking, chewing or smoking while wearing potentially contaminated clothing shall not be allowed.

16. Decontamination

a. Vital medical treatment shall always take precedence over decontamination. Radiation Safety personnel shall be available to the medical staff to advise and monitor contamination levels during all treatment phases.

(1) External "Irradiation" Scenario--Personnel are exposed to the radioactive source, external to their body, but do not come in contact with the same. These personnel are not radioactive and pose no threat to themselves or to others. No decontamination is necessary. Washing with water (warm, not hot or cold) and a nonabrasive soap is recommended. Report to Medical Officer or RPO for further assistance and clarification.

(2) Internal Contamination Scenario--Radioactive particles have entered the body via inhalation, ingestion or absorption. The individual's contamination poses a threat to himself, but no threat to others. Immediate decontamination is appropriate when absorbed. Wash area with water (warm, not hot or cold) and a nonabrasive soap. Report any inhalation or ingestion of radioactive material to a Medical Officer for evaluation and/or treatment.

(3) External Contamination Scenario--Radioactive particles have contaminated an individual's skin, hair or clothing. Immediate decontamination is appropriate. The individual may pose a threat to himself and anybody coming into physical contact with him. Carefully remove clothing without ingesting or inhaling the radioactive contamination/particles. Place in a plastic bag, sealed with tape for disposal as radioactive waste.

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### 10.3 Personnel Monitoring Equipment (Continued)

Wash areas of contamination with water (warm, not hot or cold) and a nonabrasive soap. Contaminated hair may have to be removed (clipped).

(4) Wound Contamination Scenario--Radioactive particles have entered a wound. The individual's contamination poses a threat to himself and may pose a threat to anyone coming in physical contact with him. Immediately report to a Medical Officer for treatment.

b. General and specific methods for equipment and area decontamination shall be in accordance with NRC and Army directives.

### 17. Fire and Explosion Procedures (See CAAA-R 385-7, Appendix F)

In a fire emergency, the basic concern is air-borne contamination carried out of the flames by the heated air and in the smoke. If the fire is small, an attempt to extinguish the fire shall be made. Notify all personnel to evacuate the space/area or building and to remain upwind of the fire, turn off all ventilation equipment which may be present and close all doors and hatches/windows, if possible. Notify the Fire Department and give the location of the fire. Notify the local RPO.

a. FIREFIGHTERS-- Fire should be fought with firefighting personnel standing upwind of the fire if possible. Firefighters should wear portable air systems.

b. RECOVERY-- After the fire has been extinguished, debris must be surveyed for the presence of equipment containing source, as well as contamination which MAY have been spread by burning. Monitor personnel, the firefighting equipment and the area to determine if decontamination will be necessary.

c. SURVEY INSTRUMENT-- The Eberline (E-520) is suitable for detecting the location of the source; however, wipes must be taken and evaluated to detect the presence of contamination. Follow-up evaluation of wipes on suitable laboratory equipment must be made.

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10.3 Personnel Monitoring Equipment (Continued)

d. NOTIFICATION-- The RPO/Assistant RPO will be familiar with the "Incident Reporting" procedure. (See CAAA-R 385-7, Para 12, page 15)

18. Termination of Activities Authorized by the NRC License

When CAAA decides to terminate all activities authorized by the NRC License, the following option shall be used:

Transfer all radioactive material to a recipient authorized by an NRC License or Agreement State License to receive the radioactive material; or dispose of all radioactive material as radioactive waste. Disposal shall be in accordance with NRC and Army directives.

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Item #10 - Radiation Safety Program

10.4 Operating and Emergency Procedures

1. Appendix F is the CAAA-R 385-7, Ionizing Radiation Safety, contains operating and emergency instructions. This document will remain current with changing regulatory requirements.

2. The quarterly maintenance of the exposure devices and/or storage containers is conducted by a NRC licensed vendor of such service.

3. The quarterly report of inspections, as noted above, are on file in the office of the Radiation Protection Officer.

4. Inspection is both preventive and corrective in nature. Action is conducted quarterly in conjunction with inventory schedules. Inspection of exposure devices will not be conducted if device has been in storage status during the 90-day period. In such cases, the device will be inspected prior to use.

5. The following items are addressed during each inspection:

a. Panoramic Devices (devices in which the source is physically removed from shielded container during exposure) are inspected for:

- (1) Changes in operating characteristics of the device.
- (2) Proper operation of source position indicator mechanism.
- (3) Proper operation of the crank mechanism.
- (4) Proper operation of locking mechanism.
- (5) Source and drive-cable wear or damage.
- (6) Damaged or worn source and drive-cable tube and connector wear and damage.
- (7) Rust, dirt or sludge build-up in the source tube.
- (8) Proper positioning of source inside the shield.



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10.4 Operating and Emergency Procedures (Continued)

- (9) Shifting of the shield inside the projector housing.
- (10) Proper connection of all mating components.
- (11) Damage to the device which may impair its operation.
- (12) Cable drive gear-box damage and wear.
- (13) Proper labeling.

b. Directional Beam Devices are inspected for:

- (1) Changes in the operating characteristics of the device.
- (2) Proper operation of shutter mechanism.
- (3) Chafing or binding of shutter mechanism.
- (4) Damage to the device which may impair its operation.
- (5) Proper operation of locking mechanism.
- (6) Proper labeling.

c. Storage containers are inspected for:

- (1) Possible shielding defects, such as cracks.
- (2) Proper positioning of sources(s) within the container.
- (3) Damage to the container which may impair its use.
- (4) Proper operation of locking mechanism.
- (5) Proper labeling.
- (6) Damage to connectors and source securing devices on source changers.

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#### 10.4 Operating and Emergency Procedures (Continued)

##### 6. Off-Scale Pocket Dosimeter Event

a. Stop work immediately and place the source in the safe storage position in the exposure device.

b. Notify the individuals specified in the emergency procedure (recall roster)

##### c. Pocket Dosimeter

(1) Zero pocket dosimeters (PDs) at the start of each shift. The PDs that cannot be brought to read less than 10 mrem will be rejected and returned to the calibration facility for evaluation.

(2) Read PDs often during the shift. Initial, final, and net readings for pocket dosimeters shall be recorded in the pocket dosimeter log.

##### (3) OFF-SCALE READING/NO ACTUAL EXPOSURE

(a) Treat as off-scale any PDs that have gone off-scale or drifted before actual exposure to occupational radiation. Such PDs shall be withdrawn from use and turned in to the calibration facility for evaluation.

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Item #11 - Waste Management

Sources will be returned to the supplier or other NRC licensed agency for receipt of radioactive materials. Normally when a new source is obtained, the old source is traded back to the supplier.

No other radioactive waste is generated.

## STRAIGHT BILL OF LADING — SHORT FORM — ORIGINAL — NOT NEGOTIABLE

ROADWAY EXPRESS

(Name of Carrier)

Shipper's No. 983926GK

Carrier's No.

RECEIVED, subject to the classifications and tariffs in effect on the date of issue of this Original Bill of Lading.

At

From

SHEPHERD &amp; ASSOCIATES

1010 ARROYO

SAN FERNANDO, CA 91340

EXIT NAVAL SURF. WAR. CENTER

CRANE, IN 47522

MAY 24, 1994

The property described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below, which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed, as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party, at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classification in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.

Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, including those on the back thereof, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

(Mail or street address of consignee—For purposes of notification only)

Consigned to J.L. SHEPHERD &amp; ASSOCIATES

Destination SAN FERNANDO,

State CA

County 91340

Delivery

Address \* 1010 ARROYO AVENUE

Route

(\* To be filled in only when shipper desires and governing tariffs provide for delivery thereat)

Delivering Carrier

NO PACKAGES	HAZARDOUS MATERIALS	Kind of Package, Description of Articles, Special Marks, and Exceptions	*WEIGHT (SUBJECT TO CORR)	CLASS OR RATE	CHECK COLUMN	Subject to Section 1 of conditions of applicable bill of lading, if the ship- ment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following state- ment:  The carrier shall not make delivery of the shipment without payment of freight and all other lawful charges.
1		RQ, RADIOACTIVE MATERIAL, SPECIAL FORM, N.O.S., HAZARD CLASS: 7 INDENTIFICATION NUMBER: UN2974 NAME OF RADIONUCLIDE: $^{60}\text{Co}$ ACTIVITY IN PACKAGE: 66.68 Ci LABEL REQUIRED: RADIOACTIVE TRANSPORT INDEX: $\frac{1}{2}$ PACKAGED IN ACCORDANCE WITH 49CFR 173.416(f). FOR SPECIAL FORM CONTAINER, S.N. 0047. PLACARDS REQUIRED: YES NO OVERPACK, S.N. 22026. SECURITY SEAL #: 96918 TYPE OF CONTAINER: TYPE B NMFC 100D, ITEM 164900, SUB 1	5000#	70		Per (Signature of Consignor)  If charges are to be prepaid, write or stamp here: "To be prepaid."  COLLECT  Received \$ to apply in prepayment of the charges on the property described hereon.  Agent or Cashier:  Per (The signature here acknowledges only the amounts prepaid.)  Charges Advanced:  \$

FOR SHIPMENT STATUS  
CALL 1-800-ROADWAY  
350-503006-424 HOUR RADIOACTIVE EMERGENCY  
CALL CHEMTREC 1-800-424-9300TOTAL  
PIECES 1SHIPPER'S CERTIFICATION This is to certify that the above-named materials are properly  
classified, described, packaged, marked and labeled, and are in proper condition for transportation  
according to the applicable regulations of the Department of Transportation.

SIGNATURE

TITLE

\* If the shipment moves between two ports by a carrier by water, the law requires that the bill of lading shall state whether it is "carrier's or shipper's weight."  
NOTE—Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property.  
The agreed or declared value of the property is hereby, specifically stated by the shipper to be not exceeding

\$ .40 per LB.

SHEPHERD &amp; ASSOCIATES

1010 ARROYO

SAN FERNANDO, CA 91340

Permanent post office address of shipper

Shipper, Per

Agent, Per

397905

# JL SHEPHERD & ASSOCIATES

1010 ARROYO AVE., SAN FERNANDO, CALIFORNIA 91340-1822

818-898-2361 FAX 818-361-8095

## CERTIFICATION OF SOURCE/DEVICE POSSESSION TRANSFER

This document is to certify that on or about May 23, 1994, J.L. Shepherd & Associates took possession on-site of approximately 66.68 Ci  $^{60}\text{Co}$ , contained in a Tech-Ops Model 520, S/N 0047, from Naval Surface Warfare Center located in Crane, Indiana. This transfer (preparation for shipment) took place under the direct supervision of Mike Novak working under J.L. Shepherd & Associates Radioactive Materials License No. 1777-70, Amendment No. 62, and in accordance with all regulatory agency licensing requirements. J.L. Shepherd & Associates is licensed to receive this source under State of California Radioactive Materials License No. 1777-70, Amendment 62, expiration date 11/11/95.

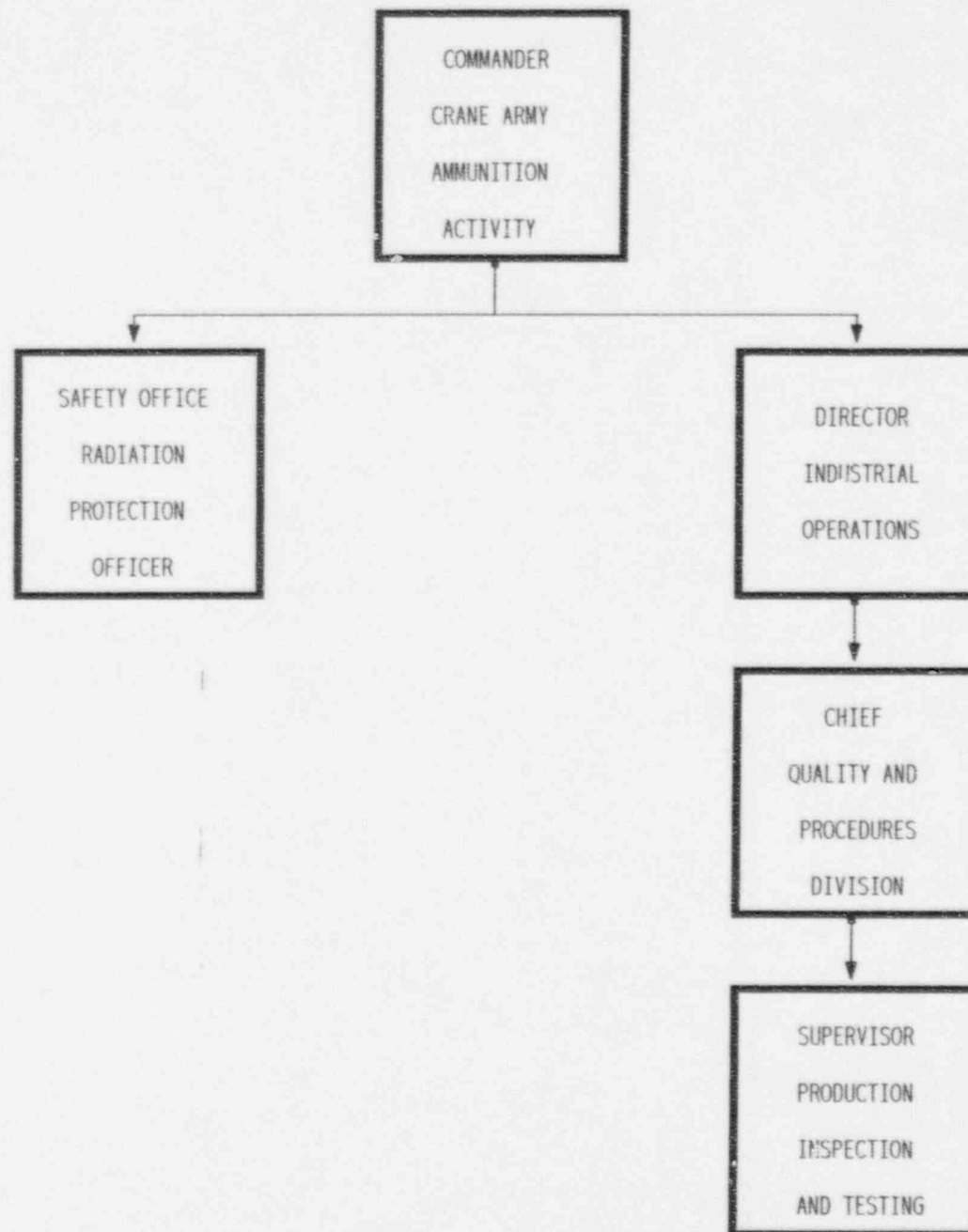
J.L. SHEPHERD & ASSOCIATES

By James D. Frazier

NAVAL SURFACE WARFARE CENTER

By Walter Shearin 5/24/94

# CRANE ARMY AMMUNITION ACTIVITY





Walter F. Shearin, Chief, Safety Office, Radiation Protection  
Officer (RPO), Crane Army Ammunition Activity (CAAA)

Training:

General:

B.S. Engineering Operations, North Carolina State University,  
1981

Certificate, Safety Engineering, U.S. Army School of Engineering  
and Logistics (SEL), 1982

Masters of Public Affairs, Indiana University, 1994

Radiation Specific:

Radiological Safety Course, Fort McClellan, AL, 1986, 120 hours

Principles of Radiological Safety, SEL, 1981, 100 hours

Radiological Safety and Hazards Evaluation II, SEL, 1981, 100  
hours

Radiography, Level I, 1990, 40 hours

Radiography, Level II, 1993, 40 hours

Radiation Safety Refresher Classes, 6 hours each, 1991, 1992,  
1993

Experience:

RPO, CAAA, September 1986 to Present

Eight years experience with a Picker X-ray Exposure Device using  
a Co-60 source.

Ronald F. Tarr, Chief of the Production Inspection Branch,  
Quality Control and Procedures Division, Industrial  
Operations Directorate, Crane Army Ammunition Activity  
(CAAA)

Training:

Radiation Specific:

Introduction to Nondestructive Inspection, 40 hours, U.S. Army  
Research Lab, Watertown, MA, 1981

Radiographic Inspection, Level I, 40 Hours, U.S. Army Research  
Lab, Watertown, MA, 1981

Isotope Radiography Training, 40 hours, Gamma Industries, Baton  
Rouge, LA, 1982

Radiographic Film Interpretation, 40 Hours, U.S. Army Research  
Lab, Watertown, MA, 1984

Radiographic Inspection, Level II, 40 Hours, U.S. Army Research  
Lab, Watertown, MA, 1981

Radiation Safety Refresher Courses, 8 hours, 1982, 1983, 1984

Experience:

Three years experience with a Picker X-ray Exposure Device using  
a Co-60 source.

Richard W. Murphy, Metals Inspector, Production Inspection  
Branch, Quality Control and Procedures Division,  
Industrial Operations Directorate, Crane Army Ammunition  
Activity (CAAA)

Mr. Murphy will serve as co-alternate RPO with Mr. Roach.

Training:

Radiation Specific:

Radiographic Inspection, Level I, 40 Hours, Stavely, Ohio, 1990.

Radiographic Inspection, Level II, 40 Hours, U.S. Army Research  
Lab, Watertown, MA, 1993

Radioactive Material Transportation, 8 hour, CAAA, 1993

Linear Accelerator Operations, 40 hours, Schromberg Corporation,  
CAAA, 1994

Radiation Safety Refresher, 6 hours, 1990, 1992, 1993

Experience:

One years experience with a Picker X-ray Exposure Device using a  
Co-60 source.

One years experience with x-ray machines: 160, 300, 320, and 420  
KV, and a fluoroscope.

Robert D. Roach, Metals Inspector, Production Inspection  
Branch, Quality Control and Procedures Division,  
Industrial Operations Directorate, Crane Army Ammunition  
Activity (CAAA)

Mr. Roach will serve as co-alternate RPO with Mr. Murphy.

Training:

Radiation Specific:

Radiographic Inspection, Level I, 40 Hours, Stavely, Ohio, 1990.

Radiographic Inspection, Level II, 40 Hours, U.S. Army Research  
Lab, Watertown, MA, 1993

Radioactive Material Transportation, 8 hour, CAAA, 1993

Linear Accelerator Operations, 40 hours, Schromberg Corporation,  
CAAA, 1994

Radiation Safety Refresher, 6 hours, 1990, 1992, 1993

Experience:

Four years experience with a Picker X-ray Exposure Device using a  
Co-60 source.

Four years experience with x-ray machines: 160, 300, 320, and 420  
KV, and a fluoroscope.

Larry McCrary, Metals Inspector, Quality Control and Procedures  
Division, Industrial Operations Directorate, Crane Army  
Ammunition Activity (CAAA)

Mr. McCrary is a Radiographer

Training:

Radiation Specific:

Radiographic Inspection, Level I, 40 Hours, June 1994

Radiographic Inspection, Level II, 40 Hours, September 1994

Initial Isotope Training 5 Hours

Initial X-Ray Training 5 Hours

General:

Eddy Current, Level I, 40 Hours, July 1994

Ultrasonic, Level I, 40 Hours, August 1994

Experience:

Over 350 hours experience operating a Picker X-Ray Exposure  
Device using a Co-60 (2000 Ci) source.

Over 550 Hours experience with operating a 420 KV X-Ray machine.

Hiram Sanders, Metals Inspector, Quality Control Division,  
Industrial Operations Directorate, Crane Army Ammunition  
Activity (CAAA)

Mr. Sanders is a Radiographer

Training:

Radiation Specific:

Radiation Safety, 4 Hours, November 1990

Radiographic Inspection, Level I, 40 Hours, December 1990

Radiography Refresher Training, 8 Hours, April 1992

Radiographic Inspection, Level I, 40 Hours, June 1994

Radiographic Inspection, Level II, 40 Hours, September 1994

General:

Introduction to Nondestructive Inspection, 40 Hours, May 1988

Eddy Current, Level I, 40 Hours, July 1994

Ultrasonic, Level I, 40 Hours, August 1994

Experience:

Over 100 Hours experience operating a Picker X-Ray Exposure  
Device using a Co-60 Source (2000 Ci).

Over 200 Hours experience with a 420 KV X-Ray machine.

Over 60 Hours experience Ultrasonic and Eddy Current testing of  
5"/54 Projectiles.



William A. Daniel, Metals Inspector, Quality and Procedures  
Division, Industrial Operations Directorate, Crane Army  
Ammunition Activity (CAAA)

Mr. Daniel is a Radiographer

Training:

Radiation Specific:

Radiographic Inspection, Level I, 40 Hours, June 1994

Radiographic Inspection, Level II, 40 Hours, September 1994

Initial Isotope training, 5 Hours

Initial X-Ray training, 5 Hours

General:

Introduction to Nondestructive Inspection, 40 hours, December  
1984

Eddy Current, Level I, 40 hours, July 1994

Ultrasonic, Level I, 40 Hours, August 1994

Experience:

Over 100 Hours experience with a Picker X-Ray Exposure Device  
using a Co-60 (2000 Ci) Source.

Over 200 Hours experience using a 420 KV X-Ray machine.

Over 200 Hours experience Ultrasonic and Eddy Current Testing of  
5"/54 Projectiles.

Martin McRoberts, Metals Inspector, Quality and Procedures  
Division, Industrial Operations Directorate, Crane Army  
Ammunition Activity (CAAA)

Mr. McRoberts is a Radiographer.

Training:

Radiation Specific:

Radiographic Inspection, Level I, 40 Hours, June 1994

Initial Isotope Training, 5 Hours

Initial X-Ray Training, 5 Hours

Radiographic Inspection, Level II, 40 Hours, September 1994

General:

Eddy Current, Level I, 40 Hours, July 1994

Ultrasonic, Level I, 40 Hours, August 1994

Experience:

Over 70 Hours experience using a Picker X-Ray Exposure Device  
using a Co-60 Source (2000 Ci)

Over 130 Hours experience using a 420 KV X-Ray machine.

Over 200 Hours experience Ultrasonic and Eddy Current Testing of  
5"/54 Projectiles

Donovan L. Sailer, Metals Inspector, Quality and Procedures  
Division, Industrial Operations Directorate, Crane Army  
Ammunition Activity (CAAA)

Mr. Sailer is a Radiographer.

Training:

Radiation Specific:

Radiation Safety Refresher Training, 2 Hours, December 1982

Isotope Radiography Program, Gamma Industries, 40 Hours, January  
1983

Radiation Safety Refresher Training, 4 Hours, December 1990

Radiographic Inspection, Level I, 40 Hours, February 1994

Radiographic Inspection, Level II, 40 Hours, September 1994

General:

Munitions Safety, Darcom Field Safety Activity, 80 Hours, March  
1984

SPC in the Manufacturing World, Perry Johnson Seminars, Inc., 20  
Hours, September 1985

Advanced Chart Interpretation SPC, Perry Johnson Seminars, Inc.,  
20 Hours, September 1985

Statistical Process Control, AMETA, 40 Hours, December 1985

SPC, Statistical Methods for Quality Improvement, Rieker  
Management Systems, 40 Hours, February 1987

Eddy Current, Level I, Stavely Schools for NDT, 40 Hours, July  
1994

Ultrasonic, Level I, Stavely Schools for NDT, 40 Hours, August  
1994

Experience:

Over 300 Hours experience with using a Picker X-Ray exposure  
device using a Co-60 source (2000 Ci).

Over 150 Hours experience with a 420 KV X-Ray machine.

Over 100 Hours experience with Ultrasonic and Eddy Current  
testing of 5"/54 Projectiles.

William C. Patterson, Metals Inspector, Quality and Procedures  
Division, Industrial Operations Directorate, Crane Army  
Ammunition Activity (CAAA)

Mr. Patterson is a Assistant Radiographer.

Training:

Radiation Specific:

Isotope Radiography Training, 40 Hours

Initial Isotope Training, 5 Hours

Initial X-Ray Training, 5 Hours

General:

Eddy Current, Level I, 40 Hours, July 1994

Ultrasonic, Level I, 40 Hours, August 1994

Experience:

Over 300 Hours experience operating a Picker X-Ray exposure  
device using a Co-60 source (2000 Ci).

Over 300 Hours experience using a 420 KV Phillips X-Ray machine.

Over 100 Hours experience performing Ultrasonic and Eddy Current  
testing of 5"/54 projectiles.

NRC Form 313 (6-93)  
Application for Material License (Renewal)  
License No. 13-18235-01  
Crane Army Ammunition Activity  
Crane, IN 47522-5099

APPENDIX D

CRANE ARMY AMMUNITION ACTIVITY

RADIOGRAPHER QUALIFICATIONS

It is requested that \_\_\_\_\_ SSN \_\_\_\_\_ be  
given training to qualify him as a radiographer.

- \_\_\_\_\_  
Date \_\_\_\_\_ Chief, Quality and Procedures Division
1. Preliminary instructions in operating and emergency procedures  
Date \_\_\_\_\_ Instructor \_\_\_\_\_
2. Tour and field test of radiographic facilities and equipment  
operation  
Date \_\_\_\_\_ Instructor \_\_\_\_\_
3. Trainee Test over operating and emergency procedures  
Score \_\_\_\_\_ Date \_\_\_\_\_ Instructor \_\_\_\_\_
4. On-the-job observation training  
Date \_\_\_\_\_ Instructor \_\_\_\_\_
5. Technical Operations or Gamma Industries training course or  
equivalent  
Dates \_\_\_\_\_ (Certificate of completion attached.)
6. Operation under radiographer observation.  
Date \_\_\_\_\_ Radiographer \_\_\_\_\_
7. Radiographer Qualification Exam (Appendix E)  
Date \_\_\_\_\_ Radiation Protection Officer \_\_\_\_\_  
Senior Radiographer \_\_\_\_\_

This trainee is qualified to be designated a radiographer.  
Date \_\_\_\_\_ Radiation Protection Officer \_\_\_\_\_

APPENDIX E

RADIOGRAPHER'S/RADIOGRAPHER'S ASSISTANT TEST

NAME \_\_\_\_\_ DATE \_\_\_\_\_

1. On-the job adherence to all regulations is the direct responsibility of the -

- A. Production Inspection Supervisor
- B. Radiation Protection Officer.
- C. All Radiographers.
- D. All of the above.

2. The maximum source strength allowed for operations at building 104 is -

- A. 2000 curies.
- B. 350 curies.
- C. 500 curies.
- D. 1000 curies.

3. The door to the control room at building 104 will be kept locked and the keys in the possession of -

- A. The Rad Safe Supervisor.
- B. RPO.
- C. The Shift Radiographer.
- D. None of the above.

4. When entering the radiography bay, the radiographer is required to have -

- A. Two dosimeters.
- B. A calibrated survey instrument.
- C. A TLD.
- D. All the above.



5. During all source exposures, radiographers assistants must wear -
- A. Only a TLD.
  - B. Only pocket dosimeters.
  - C. Neither a TLD nor a dosimeter.
  - D. Both a TLD and two dosimeters.
6. The TLD is used to measure -
- A. Heat.
  - B. Humidity.
  - C. Radiation.
  - D. Pressure.
7. TLD's will be changed -
- A. Daily.
  - B. Weekly.
  - C. Monthly.
  - D. Quarterly.
8. All dosimeters will be charged by a radiographer -
- A. After it has been worn.
  - B. Prior to being worn.
  - C. Dosimeters need not be charged.
  - D. They are charged automatically in the box.
9. The IM235/PD -
- A. Is another name for a pocket dosimeter.
  - B. Is the make and model of our TLD's.
  - C. Needs to be calibrated every three (3) months.
  - D. None of the above.

10. In case of an explosion at building 104, the radiographers primary objective must be -

- A. Secure and protect the source.
- B. Evacuation of personnel and saving lives.
- C. Notify supervisor.
- D. Evacuate himself to a safe place.

11. When entering the source bay at building 104, the first reading with the survey instrument must be made -

- A. At the open door.
- B. At the controls.
- C. At the projector.
- D. None of the above.

12. In an emergency where the radiography bay walls are undamaged and the source unaffected but the control unit is damaged, you should -

- A. Inform emergency personnel.
- B. Allow no entrance to radiography bay.
- C. Make a survey when it is safe to do so.
- D. All of the above.
- E. None of the above.

13. Radiation measurements with survey meters are important because they determine -

A. An actual amount of radiation present in the area when a source is exposed.

B. That the source is stored correctly and actually present.

C. Neither of the above.

D. Both A and B.

14. One reason for keeping evacuated personnel together at the evacuation point (lunch room) is to -

A. Account for all personnel.

B. Minimize spread of radioactive contamination.

C. Neither of the above.

D. Both A and B.

15. ALARA means as low as reasonably achievable

16. The red indicator light on the wall over controls indicates

A. Source has left projector and is in the tube

B. Source is in exposed position in the collimator

C. Source is stored in projector

D. Control crank is broken

17. A log book must be kept showing each use of the radiographic equipment

A. True

B. False

18. The radiographer is required to inspect the source projector, cables, etc. -

A. Every shift

B. Daily

C. Weekly

D. Monthly.

19. A log book covering maintenance inspections is required -

- A. True
- B. False

20. If you arrive at work and find that your survey meter is not operating properly, what should you do?

A. Complete the job quickly while keeping a close check on your pocket dosimeter.

B. Use past experience to judge where the restricted area boundary should be and complete the job.

C. Send an assistant to obtain a new instrument while you complete the first exposure.

D. Go get a properly operating survey meter.

21. While performing radiography, you note that your pocket dosimeter reads off scale. What should you do?

A. Recharge your dosimeter and continue working.

B. Complete your work and record the high reading in the log.

C. Follow the procedures for this in the Radiation Safety Regulation, CAAAR 385-7.

D. Perform a radiation survey to make sure the radiation levels are what you expect.

E. Both C and D.

22. Who is the RPO for CAAA?

WALTER F. SHEARIN

23. What signs are required on the vault door at building 104?

A. Caution Radiation Area and Danger Radioactive Material

B. Danger Radiation Area and Caution Radioactive Material

C. Caution Radioactive Material and Entering Radioactive Materials Area

D. Danger High Radiation Area and Caution Radioactive Material

E. None of the above

24. Pocket Dosimeters measure
- A. alpha radiation
  - B. beta radiation
  - C. gamma radiation
  - D. none of the above
25. What are the three basic elements of radiation protection?
- A. distance, time and shielding
  - B. shielding, distance and source strength
  - C. type of operation, number of people in the area and location
  - D. type of collimation, survey instrument and dosimeter
26. In the event of an emergency involving an explosion, the two primary objectives are:
- A. notify supervision and secure the building
  - B. secure the source and evacuate personnel
  - C. evacuate personnel and save lives
  - D. monitor area and set up warning signs
  - E. none of the above
27. Our exposure devices may only be operated by:
- A. inspection supervisors
  - B. radiation safety personnel
  - C. qualified radiographers
  - D. any inspection personnel designated by the division manager
  - E. all of the above

28. One chief purpose of the radiation survey of the exposure device after the source has been retracted is to:

- A. see if the survey meter is working
- B. calibrate the survey meter
- C. check the dosimeter's performance in actual practice
- D. assure that the source is actually in the device
- E. all of the above
- F. none of the above

29. Our survey meters

- A. measure gamma radiation from the source
- B. are not sensitive to gamma radiation
- C. directly indicate the number of curies in the source
- D. measure the x-rays by subtracting gamma radiation
- E. none of the above

30. The dosimeter you use reads in

- A. rems per minute (rem/min)
- B. roentgens per minute (R/min)
- C. milliroentgen per hour (mR/hr)
- D. cosmic rads per day (cr/day)
- E. Cobalt 60 per curie (Co60/Ci)

31. A malfunctioning survey instrument

- A. should be used for the remainder of the operation and then sent in for repair
- B. must not be used
- C. used, but add 10 percent to the indicated reading to compensate for the malfunction
- D. all of the above
- E. none of the above



32. CAAA's NRC license allows source operations at any location that CAAA controls.

A. True

B. False

33. List three people on the recall list to call in the event of an emergency involving the source.

<u>WALT SHEARIN</u>	<u>(RPO)</u>
<u>DALE ROALH</u>	<u>(Asst RPO)</u>
<u>LTC CONRAD</u>	<u>(Commander)</u>

34. A qualified radiographer can work alone during source operations?

A. True

b. False

Department of the Army  
Crane Army Ammunition Activity  
Crane, IN 47522-5099

## Safety

20 SEP 1994


## IONIZING RADIATION SAFETY

**Applicability.** This regulation applies to all elements of Crane Army Ammunition Activity (CAAA). This procedure establishes minimum requirements for all personnel working with an ionizing radiation source. This procedure applies to any CAAA employee working with such a source whether it be in an x-ray or radiographic operation, a quality assurance operation, or a storage operation.

**Suggested Improvements.** The proponent of this regulation is the Safety Office (SMCCN-SF). Users are invited to send comments and suggested improvements to SMCCN-SF, building 13.

**Distribution.** A, B, AFGE.

Official:

  
MICHAEL L. CONRAD  
LTC, OD  
Commanding

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1. PURPOSE. The purpose of this regulation is to establish requirements to ensure the protection of Crane Army Ammunition Activity (CAAA) personnel against the effects of ionization radiation.

2. REFERENCES.

a. 10 Code of Federal Regulations (CFR) Parts 0 to 50, Energy.

b. 49 CFR Parts 171 to 177, Transportation.

c. AR 40-14, Medical Services, Control and Recording Procedures of Exposure to Ionizing Radiation and Radioactive Materials,  
15 Mar 82.

d. AR 385-11, Safety, Ionizing Radiation Protection, (Licensing, Control, Transportation, Disposal, and Radiation Safety), 1 May 1980.

e. MIL-STD-410E, Military Standard, Nondestructive Testing Personnel Qualification and Certification, 23 Jul 74.

f. SB 742-1, Supply Bulletin, Inspection of Supplies and Equipment, Ammunition Surveillance Procedures, Nov 90.

g. NRC License 13-18235-01, CAAA License for Radioactive Material, Issued 26 Jun 90, Expires 31 Mar 95.

3. DEFINITION OF TERMS.

a. Licensed material. Source material, special nuclear material, or by-product material received, possessed, used, or transferred under a general or specific license issued by the Nuclear Regulatory Commission (NRC).

b. Absorbed dose. The energy imparted by ionizing radiation per unit mass of irradiated material. The units of absorbed dose are the rad and the gray.

c. Radiation area. An area, accessible to individuals, in which radiation levels could result in an individual receiving a dose equivalent in excess of 0.005 rem (5 millirem (mrem) or 0.05 milliSievert (mSv)) in 1 hour at 30 centimeters (cm) from the radiation source or from any surface that the radiation penetrates.

d. High radiation area. An area, accessible to individuals, in which radiation levels could result in an individual receiving

a dose equivalent in excess of 0.1 rem (100 mrem or 1 mSv) in 1 hour at 30 cm from the radiation source or from any surface that the radiation penetrates.

e. Very high radiation area. An area, accessible to individuals, in which radiation levels could result in an individual receiving an absorbed dose in excess of 500 rads (5 grays) in 1 hour at one meter from a radiation source or from any surface that the radiation penetrates.

f. Unrestricted area. An area to which access is not restricted or controlled for the purpose of protection of individuals from exposure to radiation and radioactive materials.

g. Restricted area. Any area where access is controlled for the purpose of protection of individuals from exposure to radiation and radioactive materials.

h. ALARA. An acronym for "as low as reasonably achievable". Every reasonable effort must be made to maintain exposures to radiation as far below the dose limits in this regulation as is practical.

i. Background or natural radiation. Radiation from cosmic sources; naturally occurring radioactive materials, including radon and global fallout as it exists in the environment from testing of nuclear explosive devices. It does not include radiation from source, byproduct, or special nuclear material regulated by the NRC.

j. Declared pregnant women. A woman who has voluntarily informed her employer, in writing, of her pregnancy and the estimated date of conception.

k. Occupational dose. Dose received by an individual in a restricted area or in the course of employment in which the individual's assigned duties involve exposure to radiation and to radioactive material. Occupational dose does not include dose received from background radiation, as a patient from medical practices, or as a member of the general public.

l. Permanent Radiographic installation. A shielded installation or structure designed or intended for radiography and in which radiography is regularly performed.

m. Radiographer. Any individual who performs or who, in attendance at the site where the sealed source or sources are being used, personally supervises radiographic or x-ray operations and who is responsible for ensuring compliance with NRC and license requirements.

n. Radiographer's assistant. Any individual who under the personal supervision of a radiographer, uses radiographic exposure or x-ray devices, sealed sources or related handling tools, or radiation survey instruments in radiography.

o. Level I and II radiographers. Quality level designators for radiographers who have been trained IAW reference e. These individuals will have a minimum of 40 hours of classroom training for each level.

p. Termination. The end of an individual's employment with CAAA or the end of permanent work assignment in radiography with no anticipation of the individual ever working in radiography again.

q. Radiography. The examination of a specimen using a sealed source or electronically generated (x-ray) gamma rays.

r. Ionizing radiation. Radiation capable of producing ionization, including energetic charged particles such as alpha and beta particles, or nonparticulate radiation such as x-rays and gamma rays.

s. Radiation Protection Officer/Radiation Safety Officer (RPO/RSO). A person appointed by the Commander to give advice on the hazard of ionizing radiation and to supply effective ways to control these hazards. This individual is approved on the NRC license and has knowledge of, responsibility for, and authority to ensure compliance with appropriate radiation protection rules, standards, and practices on behalf of the Commander.

#### 4. IONIZING RADIATION CONTROL COMMITTEE (IRCC).

a. The IRCC is an advisory body to the Commander. It should consist of the:

- (1) Commander.
- (2) The RPO.
- (3) Medical Officer.
- (4) Safety Officer.
- (5) Or representatives of (1) through (4)
- (6) Representatives of employee organizations

b. The committee will advise the Commander involving local rules and procedures for procurement, storage, and safe use

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of radiation sources. It is to evaluate incident reports and look at all radiation exposures.

c. The IRCC must meet quarterly, but can meet more often if the Commander so desires.

d. Minutes are to be kept of the Committee meetings.

5. GENERAL RADIATION SAFETY.

a. No minor (person under 18 years of age) should be allowed in a restricted area nor will he be allowed in any area with ionizing radiation that could lead to an exposure of 0.125 rem or greater within a calendar quarter. If circumstances require that a minor enter a restricted area, the RPO must be notified and the minor must be provided with a thermoluminescent dosimeter (TLD) to monitor exposure to ensure that it is less than 0.125 rem per quarter.

b. The dose to an embryo/fetus during the entire pregnancy, due to occupational exposure, of a declared pregnant woman cannot exceed 0.5 rem (5 mSv). If circumstances require that a declared pregnant woman enter a restricted area, the RPO must be notified and the woman must be provided with a TLD to monitor exposure.

c. Except for planned special exposures, the occupational dose to a radiation worker shall not exceed 1.25 rem per quarter to the whole body; head and trunk; active blood-forming organs; lens of the eye; or gonads. Exposure will be monitored by the RPO by means of a TLD. Any exposure greater than 0.5 rem (5 mSv) (considered an action level) will result in the following:

(1) The individual and supervisor will be notified.

(2) The individual will be removed from work with ionizing radiation sources pending a positive response to a memorandum from the supervisor, through the RPO, to the Commander. This memorandum will request the individual be allowed to continue work with ionizing radiation sources and will state the specific steps that will be taken to minimize future exposures.

d. Prior to long-term assignment as a radiographer's assistant or first entry of any individual into a restricted area during each employment or work assignment in which the individual could receive in excess of 0.3125 rem in any quarter, the RPO must be contacted. The RPO must ensure the following is done:



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(1) The individual's prior occupational dose for the quarter must be determined and documented to ensure the occupational limit will not exceed the maximum specified in 5.c.

(2) All prior occupational exposure must be documented in the individual's medical file.

(3) The person is to be included in the radiation program by Medical Department who will ensure that a periodic radiation physical is scheduled and that individual's exposure is tracked IAW NRC requirements.

e. All occupational radiation exposures will be tracked by means of a TLD. The results will be posted in the individual's medical record after being viewed by the RPO.

f. No radioactive material shall create, in any unrestricted area, radiation levels which, if an individual were continually present in the area, could result in an exposure in excess of 2 mrem in 1 hour or 100 mrem in any 7 consecutive days.

g. Radiation areas must be posted with a sign bearing the words:

CAUTION<sup>1</sup>  
RADIATION AREA

h. High radiation areas will be:

(1) Posted with a sign bearing the words:

CAUTION<sup>1</sup>  
HIGH RADIATION AREA

(2) Equipped with a control device that will cause the level of radiation to be reduced below 100 mrem/hour if someone should enter the area; and/or:

(3) Equipped with a control device which shall energize a conspicuous visible or audible alarm signal that will warn an individual entering the area of the hazard.

(4) The controls in (2) and (3) shall be established in such a way that no individual will be prevented from leaving a high radiation area (i.e. panic hardware on doors).

---

<sup>1</sup> Or "DANGER"

i. Ensure survey meters are calibrated at least quarterly and that pocket dosimeters are calibrated semi-annually.

j. The RPO and all radiation workers will follow the ALARA principle. All radiation exposures will be kept as low as reasonably achievable.

6. ISOTOPE RADIOGRAPHY AND X-RAY OPERATIONS. All isotope radiography and x-ray operations will be conducted by at least one radiographer. This radiographer will normally have a Level II certification but, can be an experienced Level I radiographer with concurrence of the RPO. The radiographer will be assisted by another radiographer or by a radiographer's assistant.

a. Training.

(1) Radiographers:

(a) Trained prior to expiration of NRC license (Mar 95), reference g, will receive training IAW the requirements of that license.

(b) Trained after renewal of this license will:

<1> Receive 40 hours of safety training. This training will cover the subjects listed in Appendix A. This training can be developed on-station or can be given by a contractor.

<2> Receive Level I and, if required, Level II training per the requirements of the American Society for Nondestructive Testing (ASNT).

<3> Have, at a minimum, 13 weeks on-the-job training.

<4> Will take and pass a written safety certification examination from an NRC approved certifying agency (i.e. ASNT) within 2 years after final publication of NRC Proposed Rule Change for Parts 34 and 150, published in the Federal Register on 28 Feb 94.

<5> Will receive 8 hours of refresher training in radiation safety principles, applicable regulations, and emergency procedures annually.

(2) Radiographer's Assistants will work with and under the direct supervision of the radiographer. They will never be allowed to perform radiography operations alone. They will:

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<a> Receive 3 hours of initial training as outlined in Appendix B. This training may be given by the RPO or by a qualified radiographer.

<b> Take a written exam administered by either the RPO or a qualified radiographer.

<c> Take a field test on the equipment, safeguards, etc., given by the RPO or a qualified radiographer.

<d> Will receive 8 hours of refresher training in radiation safety principles, applicable regulations, and emergency procedures annually.

(3) Radiographers and Radiographer's assistants will receive copies, or have copies made available at the worksite, of applicable NRC regulations, including 10 CFR Parts 30.7, 30.9, 30.10, the sections of Part 34 that apply to radiography operations, and NRC Regulatory Guide 8.29, Instructions Concerning Risks From Occupational Radiation Exposure.

(4) Women of childbearing age, acting as radiographers or assistants, will also receive instructions on the effects of prenatal radiation exposure and the definition of declared pregnant women. They will be given a copy of NRC Regulatory Guide 8.13, Instructions Concerning Prenatal Radiation Exposure.

(5) Radiographers and Radiographer's assistants must demonstrate understanding of NRC regulations, license requirements, emergency procedures, and competence in the use of radiographic exposure devices, sealed sources, and survey instruments. This will be demonstrated by a written and field exam administered by the RPO (see 5.a.(2) above).

(6) The RPO will conduct an annual inspection program of the job performance of each radiographer and radiographer's assistant. This will consist of:

(a) Observation of the performance of each radiographer and radiographers assistant during an actual radiographic operation. This should be done at least one time throughout the fiscal year.

(b) If a radiographer or assistant has not worked in radiography for more than 6 months, the RPO must ensure that his performance is observed and recorded the next time he participates in a radiography operation. This observation can be done by the RPO or by a qualified representative of the RPO (i.e., another radiographer).

b. Dosimetry.

(1) Personnel assigned to radiography operations will wear two pocket dosimeters and one TLD. The dosimeter gives an immediate indication of exposure. The TLD is the only permanent record of the exposure that is received. The following rules apply:

(a) Do not take these items home. If for some reason they aren't removed at work, do not store them in your car or in direct sunlight. Do not take them to the doctor or hospital when you are going to get an x-ray as they will record your non-occupational exposure.

(b) Store them in the designated storage areas only. Do not store them where they can receive a dose when not in use.

(c) Wear them on your upper torso area (i.e. shirt pocket).

(d) Do not share TLDs. They are to be assigned to one person and utilized only by that person. If a TLD is lost, report it to the RPO immediately.

(2) Pocket dosimeters give an immediate indication of dose. There are many different brands that can be used, but they must have a scale of 0 to 200 mrem. They can be made to show a reading by jarring or dropping them. Handle them with care. The following rules apply:

(a) Record the initial and final reading for both dosimeters in the utilization log daily.

(b) Zero each pocket dosimeter daily. If it cannot be brought to read less than 10 mrem, reject it and return it for recalibration.

(c) Read the dosimeters periodically throughout the day (i.e. at each break and at lunch).

(d) Report any incident of loss or breakage to the RPO.

(3) Pocket dosimeters found to be off-scale after radiography operations require immediate action to evaluate and minimize possible personnel exposure. The following steps should be taken:

(a) If either pocket dosimeter shows a reading more than a few mrem, contact the supervisor and the RPO. While this is not an indication of a high exposure, it is an indication that

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there may be a procedural problem in the radiography area. The RPO will evaluate the situation and determine if any corrective action is necessary.

(b) If even one dosimeter shows a reading of 100 mrem or more, stop operations, conduct an immediate survey of the area to establish a safe perimeter, secure the area, and call the RPO immediately. This could indicate a serious situation. If the possibility of radiation exposure cannot be ruled out, the RPO will send the TLD to be processed immediately. The decision to allow the individual to return to work with the isotope prior to receiving the results of the TLD will be up to the RPO or his designated representative.

(c) If even one dosimeter goes off-scale - becomes totally discharged - this is an indication of a possible emergency situation. Take the following steps:

- <1> IMMEDIATELY CEASE OPERATIONS.
- <2> Conduct an immediate survey.
- <3> Establish a safe perimeter.
- <4> Secure the area.
- <5> Contact the RPO.

If the possibility of radiation exposure cannot be ruled out, the RPO will send the TLD to be processed immediately. The decision to allow the individual to return to work with the isotope prior to receiving the results of the TLD will be up to the RPO or his designated representative. The RPO will determine if a reportable incident has occurred. If it has, it will be reported IAW paragraph 10 of this regulation. A local incident report (NSWCC 5100/13) will be filed, either by the supervisor or the RPO. A copy of this report will be maintained in the Safety Office. NOTE: If you bump or drop your dosimeter, immediately check it to see if it off-scale. If it is off-scale or shows a high reading (i.e. in excess of 100 mrem), call the RPO and ask for instructions. Do not continue to work in the radiography area without his clearance.

c. Daily Start-up Procedures. The following procedures are to be implemented prior to startup daily.

(1) Upon entering the radiography area, verify the gamma lights above the control door are not flashing. If they are flashing, take precautions.



(2) All radiography personnel are to don two pocket dosimeters and one TLD immediately upon entering the area. Pocket dosimeters should be zeroed daily.

(3) Verify the survey meter has been calibrated and the battery is charged. If meter is not working properly, obtain another one before proceeding any further.

(4) Using a calibrated survey meter, check the area above the lead-lined lattice doors to the Cobalt 60 (Co-60) area to ensure the source is not in an exposed condition. If meter indicates source is in an exposed condition, attempt to close the cyclops with the controls. If this is ineffective, close it manually. Use the minimum number of personnel for the manual closing. Notify the RPO.

(5) Start the Co-60 cycle; observe the lights on the control console and gamma lights above both doors. If any of the lights are out, replace the bulbs. If this is not effective, close the Cyclops and contact an electrician. (Do a survey to ensure the source is closed prior to allowing any maintenance work in the area.)

(6) Open the door slightly (just enough to activate alarm) to the Co-60 area while the source is exposed to ensure door interlocks are working. The alarm bell should ring and the Cyclops should turn itself off. If the interlock is not working as designed, close the Cyclops, do a survey to verify the source is not exposed, and contact maintenance.

(7) Turn on x-ray machine, ensure x-ray imminent light comes on prior to the 7 second delay and that gamma light comes on when x-rays are being produced. Verify the interlocks are functioning properly. Survey over door to ensure head pointed the right direction.

d. Operating Procedures.

(1) Fill out the isotope utilization log, or the x-ray log, whichever applies, with at least the following information:

- (a) radiographers name
- (b) date
- (c) type of radioactive material (or x-ray machine)
- (d) dosimeter serial numbers and beginning daily readings,
- (e) survey type, serial number, and calibration date

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(f) person securing source in evening

(2) A survey meter will be carried with the radiographer or assistant each time the radiography bay is entered during isotope radiography. This meter must be calibrated and should be set on the X1 setting. This procedure is not required for x-ray operations, but is recommended.

(3) Any time the bay is left unattended, the door to the radiography area is to be locked and the key is to be in the possession of the radiographer or put in the safe in the film viewing area.

e. Shutdown Procedures.

(1) Survey the area to ensure the Co-60 source is secure.

(2) Verify all keys to the radiography area are accounted for.

(3) Fill out utilization log with ending dosimeter readings and total dose for the day. Sign log book. Person securing area must verify all log entries have been completed.

(4) Lock keys for the Co-60 Cyclops in the safe in film reading room.

(5) Lock the radiography/x-ray bay. Secure the key in security safe in outside hallway.

f. Portable X-ray Operations.

(1) All portable x-ray operations will require a written, signed Quality Control Instruction that contains safety precautions and procedures.

(2) A barricade will be placed at the 2 mrem per hour limit and marked to ensure the public cannot enter. A survey will be done to ensure this limit is accurate.

(3) The RPO will be notified prior to any portable x-ray operation. He will assist the radiographer in making calculations to determine a safe working area.

(4) The Security Department will be notified prior to start of operations. All effected departments will also be notified to ensure that personnel are kept clear of the area.

7. STORAGE OF MUNITIONS WITH RADIOACTIVE COMPONENTS.



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a. Munitions with radioactive components present little, if any, hazard to personnel. Therefore, unless the license specifically states that TLDs must be worn, they will not be used. Normal precautions will be taken:

(1) Food and drink will not be used in a magazine with ammunition items containing radioactive material.

(2) Do not sit on pallets of material containing radioactive material.

b. The RPO will maintain a copy of each license authorizing storage of the ammunition items containing radioactive material. He must ensure the license is current and not expired.

c. The division responsible for storing ammunition will notify the RPO prior to putting ammunition items containing radioactive material in a magazine (hereafter called a radiation magazine) for the first time. They will also notify the RPO whenever a radiation magazine is completely emptied of radioactive material. The RPO will perform swipe tests and baseline surveys prior to using a magazine as a radiation magazine. He will perform swipe tests and ending surveys after the magazine has been emptied. This will ensure (and document) that no contamination has occurred.

d. The division responsible for storing ammunition will ensure that each magazine is posted with a sign saying "Caution Radioactive Materials" and has an NRC-Form 3 poster inside. These signs and posters will be removed when the magazine is no longer used for radioactive items.

#### 8. SURVEILLANCE OPERATIONS OF MUNITIONS WITH RADIOACTIVE COMPONENTS.

a. Some surveillance operations require items with depleted uranium (DU) be swipe tested. When this requirement occurs, the following procedures will apply:

(1) The person taking the swipe tests will wear surgical gloves.

(2) All open sores on the arms and hands will be covered.

(3) Each individual swipe will be assigned a different identification number. This number will be used to identify where the swipe test was taken.

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(4) The swipes will be placed in a ziplock type plastic bag. The bag will be taken to the RPO to be sent for processing to:

Chief, USAIRDC  
U.S. Army TMDE Activity  
ATTN: AMXTM-S-LR-DR  
Lexington, KY 40511-5102  
DSN 745-3948, Commercial 606-293-3948

Crane Army Ammunition Activity's identification number with Lexington is KAH.

(5) The surgical gloves will be placed in a plastic container, (i.e., a garbage bag) and treated as if contaminated with alpha contamination. Once the processing unit has cleared the swipes, the gloves and bag can be disposed of as normal trash.

(6) If the swipes show alpha contamination, a second sample will be taken to verify the results. The bag and gloves will then be dealt with by the RPO IAW regulations.

b. Swipes will be obtained by each directorate that needs them. The Safety Office will not provide them. They may be obtained through the general supply system.

## 9. REPORTS/SURVEYS.

### a. Surveys.

(1) A quarterly survey and inventory will be conducted by the RPO for all material used in radiography. A survey of ammunition items with radioactive components will be conducted IAW the individual license requirements. The survey must list the type of radioactive material, the date of the survey, the location of the material, and the name of the person conducting the survey.

(2) The RPO will pull the SDS report that details the radioactive items on inventory. This report is generated monthly, but should be pulled at least quarterly. The RPO will ensure this report correlates with his inventory and that he is licensed to have all the items listed.

(3) Alarms at the permanent radiography facility will be tested quarterly.

(4) Leak tests will be performed at intervals not to exceed 6 months.

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(5) Each survey meter will be calibrated at intervals not to exceed 3 months.

b. Reports.

(1) A report of exposure of radiation workers must be submitted to the NRC annually. This report must cover the calendar year and must be submitted by 30 April for the previous year. The report must be in the form required by 10 CFR 20.2206. The report must be sent to:

REIRS Project Manager  
Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

(2) Incidents will be reported as prescribed in paragraph 12 of this regulation.

10. RECORD MAINTENANCE.

a. Training Records. Records must be maintained of all training, field examinations, and inspections of job performance. The Directorate responsible for radiography operations will forward a copy of these records to the RPO. These records will be maintained by the RPO for 3 years after they are made. The records must contain:

- (1) Radiographer certification documents.
- (2) Certification status verification documents.
- (3) Copies of written tests.
- (4) Dates and scores of field examinations and name of individual conducting the exam.
- (5) Record of annual safety review. The record must list the topics discussed, the dates of the review, the name of the instructor and attendees.
- (6) Record of annual inspection listing what items were checked and what was found. Any discrepancies must be documented.

b. Survey Records. Copies of the quarterly surveys must be maintained for at least 3 years.

c. Dosimetry Records. Dosimetry records (reports from TLDs or film badges) must be retained until the NRC license is

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terminated. They are maintained in the medical files of personnel.

d. Leak Test Records. Leak test records must be maintained for at least 3 years.

e. Calibration Records. Calibration records will be maintained for at least 3 years after the date of calibration.

f. Records of Material.

(1) A record of receipt of radioactive material (this does not include ammunition items) shall be kept as long as the material is possessed and for 3 years following transfer or disposal of material.

(2) A record of transfer of material shall be retained for 3 years after each transfer.

(3) A record of disposal of material shall be retained until the NRC terminates the license that authorized the disposal.

g. Minutes of the IRCC. Minutes will be kept for a minimum of 3 years.

#### 11. EMERGENCY PROCEDURES.

a. In the event of an incident involving radioactive materials, contact one or more of the following personnel, in the order listed, as required:

- (1) RPO
- (2) Alternate RPO
- (3) Commander
- (4) Executive Officer

The RPO will provide a memorandum for the radiography area with the above personnel's name, daytime, and home phone numbers.

b. In the event an incident is reportable to the NRC (see paragraph 11c.), notify the U.S. Army Armament, Munitions, and Chemical Command (AMCCOM) prior to notifying the NRC. Ensure AMCCOM will notify the U.S. Army Materiel Command (AMC). Some incidents are also reportable to HQDA (see paragraph 11e.) When

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this occurs, ensure AMCCOM will send the message through channels to HQDA. The phone numbers and office symbols are:

(1) AMCCOM Safety Office, AMSMC-SF, DSN 793-2989/2962, Commercial (309) 782-2989/2962; AMCCOM Duty Officer, DSN 793-5621/6612;

(2) AMC Safety Office, AMCSF-P, DSN 284-9475, Commercial (703) 274-9475; AMC Duty Officer, DSN 284-9223;

(3) HQDA Safety Office, DACS-SF, DSN 255-7291, Commercial (202) 695-7291.

(4) Nuclear Regulatory Commission, NRC, Region III, 799 Roosevelt Road, Glen Ellyn, IL, Commercial (708) 829-9500.

c. The following events are reportable to the NRC within the time period specified:

(1) As soon as possible, but not later than 4 hours, after the discovery of any event where personnel normally are able to take any immediate protective action necessary to avoid either exposures to or releases of radioactive materials that could exceed regulatory limits but are prevented from doing so;

(2) Within 24 hours of the discovery of any unplanned radioactive contamination event that: (1) requires access to a contaminated area, by workers or members of the public, to be restricted for more than 24 hours; (2) involves a quantity of radioactive material greater than 5 times the lowest annual limit on intake specified in Appendix B to 10 CFR Part 20; or (3) access to an area is restricted for a reason other than to allow isotopes less than 24 hours to decay prior to decontamination.

(3) Within 24 hours of the discovery of any event in which safety equipment is disabled or fails to function as designed -- if the equipment is required by NRC regulations or license condition to prevent releases of radiation exceeding regulatory limits or exposure to radioactive materials in excess of regulatory limits, or to mitigate the consequences of an accident, or the equipment is required to be available and operable to perform the required safety function when the failure occurs and no redundant equipment is available and operable to perform the required safety function;

(4) Within 24 hours of the discovery of any event that requires unplanned medical treatment at a medical facility of an individual with spreadable contamination on the clothes or body;

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(5) Within 24 hours of the discovery of any unplanned fire or explosion resulting in damage to licensed radioactive material or any device, container or equipment containing licensed radioactive material in excess of specified limits, and when the damage affects the integrity of the licensed material or its container.

d. Any reportable NRC event requires a written follow-up report that must be submitted within 30 days to both AMCCOM and the NRC.

e. The following situations require immediate notification of AMCCOM, who should notify AMC, who should, in turn, notify HQDA. These situations also require you notify the NRC within 4 hours.

(1) For excessive personnel exposure that may have caused or threatened to cause exposure of whole body to 25 or more rems; or 150 or more rems to skin of the whole body; or 375 rems or more to the feet, ankles, hands, or forearms.

(2) For excessive release of radioactive material into the air or water that may have caused or threatened to cause radiation concentration, averaged over a period of 24 hours, excessive by 5000 times, 10 CFR, Appendix B, Table II.

(3) For theft or loss of radioactive materials such that quantity or circumstances could result in a substantial hazard to persons in unrestricted areas.



APPENDIX A

TRAINING REQUIREMENTS FOR RADIOGRAPHERS  
AFTER 31 MAR 95

1. Fundamentals of Radiation Safety
  - a. Characteristics of gamma radiation.
  - b. Units of radiation dose and quantity of radioactivity
  - c. Hazards of exposure to radiation
  - d. Levels of radiation from licensed material
  - e. Methods of controlling radiation dose - time, distance, shielding
2. Radiation Detection Instruments
  - a. Use, operation, calibration, and limitations of radiation survey instruments
  - b. Survey techniques
  - c. Use of personnel monitoring equipment
3. Equipment to be Used.
  - a. Operation and control of radiographic equipment and storage containers, including pictures or models or source assemblies
  - b. Storage, control and disposal of licensed material
  - c. Maintenance of equipment
4. The requirements of pertinent Federal and Army regulations.
5. Case Histories of Accidents in Radiography.



## APPENDIX B

TRAINING REQUIREMENTS FOR  
RADIOGRAPHER'S ASSISTANTS

1. Radiation Protection Program.
  - a. Applicable sections of 10 CFR, including parts 19, 20, 21, and 34.
  - b. Applicable Army regulations.
  - c. Local NRC License
  - d. Adherence to Regulations
2. Operating Instructions.
  - a. Who is authorized to operate equipment
  - b. Requirements for usage of instruments.
  - c. Specific instructions at operating sites.
    - isotope radiography within permanent facility
    - x-ray operations within permanent facility
    - portable x-ray operations
3. Dosimetry.
  - a. TLDs.
  - b. Pocket Dosimeters.
  - c. Requirements.
    - Use
    - Care
    - Operation
    - Calibration
4. Posting Requirements.
5. Radiation Surveys.
  - a. Purpose.
  - b. Requirements.
  - c. Methods.

6. Maintenance and Inspection.
  - a. Inspection requirements and frequencies.
  - b. Maintenance requirements and frequencies.
  - c. Daily requirements prior to startup.
7. Emergency procedures.
  - a. Possible personnel exposures
  - b. Incident within vicinity of source.
    - Malfunction of source camera
    - fire, etc.
  - c. Explosion or fire in the building.
  - d. Emergency notification procedures
8. Isotope radiography versus x-ray
9. Practical
  - a. Provide a tour of the facility
  - b. Discuss specific radiation protection for the facility
  - c. Interlock system
  - d. Using and securing equipment
  - e. Correct start-up and survey procedures.
10. On-the-job training.

IDMS.FLM-004-01 (9/91)

STATE OF ILLINOIS  
DEPARTMENT OF NUCLEAR SAFETY

## RADIOACTIVE MATERIAL LICENSE

DIVISION OF RADIOACTIVE MATERIALS  
1035 OUTER PARK DRIVE  
SPRINGFIELD, ILLINOIS 62704

Pursuant to the Illinois Radiation Protection Act and the rules and regulations in 32 Illinois Administrative Code promulgated thereunder, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, own, possess and transfer radioactive material(s) listed herein; and to use such radioactive material(s) for the purpose(s) and at the place(s) designated below. This license is subject to all applicable rules, regulations and orders of the Illinois Department of Nuclear Safety now or hereafter in effect and to any conditions specified in the license. This document confirms that the licensee has registered the sources of radiation listed below in accordance with Section 2 of the Radiation Installations Act.

## LICENSEE

Stan A. Huber Consultants, Inc.  
200 North Cedar Road  
New Lenox, Illinois 60451

## LICENSE NUMBER

IL-01013-01

## EXPIRATION DATE

November 30, 1996

## AMENDMENT NUMBER

7

Attention: Stan A. Huber  
President

In accordance with letter dated July 1, 1993, License Number IL-01013-01 is amended in its entirety. Previous amendments are void.

ITEM	RADIOISOTOPE	CHEMICAL and/or PHYSICAL FORM	MAXIMUM ACTIVITY* PER SOURCE	MAXIMUM POSSESSION LIMIT
A.	Cs-137	Sealed sources - Technical Operations Model 72602	100 mCi	300 mCi
B.	Cs-137	Sealed sources - J. L. Shepherd Model 6810	150 mCi	600 mCi
	Cs-137	Sealed sources - Technical Operations Model 77302	165 mCi	990 mCi
D.	Cs-137	Sealed sources - J. L. Shepherd Model 6810	1 Ci	3 Ci
E.	I-125	Sealed sources - Amersham Model IMC-P2 or AECL Model C-324	500 mCi	1,000 mCi
F.	Any radioactive material with atomic numbers 1 - 83, inclusive	Any sealed source manufactured and distributed by persons specifically approved by the Department, the Nuclear Regulatory Commission, an Agreement State, or a Licensing State	15 mCi	3,000 mCi
G.	Any with half- life less than 100d	Any	15 mCi	3,000 mCi
H.	Any with half- life greater than 100d	Any	200 $\mu$ Ci	3,000 mCi

\*  $\mu$ Ci-microcurie; mCi-millicurie; Ci-Curie; MBq-Megabecquerel; GBq-Gigabecquerel; TBq-Terabecquerel; g-gram;  $\mu$ g-microgram; kg-kilogram

APPROVED BY:

DATE

PAGE of PAGES

*Joseph G. Klingner*  
Joseph G. Klingner, Head of Licensing Section

September 29, 1993

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7

IDMS.FLM-004-02 (8/91)

STATE OF ILLINOIS  
DEPARTMENT OF NUCLEAR SAFETY  
**RADIOACTIVE MATERIAL LICENSE**

ENSEE	LICENSE NUMBER	AMENDMENT NUMBER	EXPIRATION DATE
scan A. Huber Consultants, Inc.	IL-01013-01	7	November 30, 1996

ITEM	RADIOISOTOPE	CHEMICAL and/or PHYSICAL FORM	MAXIMUM ACTIVITY* PER SOURCE	MAXIMUM POSSESSION LIMIT
I.	Any	Any sealed source manufactured and distributed by persons specifically approved by the Department, the Nuclear Regulatory Commission, an Agreement State, or a Licensing State	Any	Any
J.	Any	Environmental, wipe or leak test sample	Any	10 Ci
K.	Any, except as noted below	Any	Any	Any
L.	Special Nuclear Material	Any	Any	As per 32 Ill. Adm. Part 310.20
M.	U-238 (depleted)	Solid Metal		365 kg

AUTHORIZED USE:

- A. For possession and use in Victoreen and Tech Ops Model 726 calibrators for calibration of instruments.
- B. For possession and use in J.L. Shepherd Series 28-5 calibrators for calibration of instruments.
- C. For possession and use in Victoreen and Tech Ops Model 773 calibrators for calibration of instruments.
- D. For possession and use in J.L. Shepherd Series 28-6 calibrators for calibration of instruments.
- E. For possession, storage, and use in Lixiscope devices or bone densitometry devices incident to demonstration and training of individuals.
- F. through H. For possession and use as check, calibration, or reference sources.
- I. For use incident to removal, recovery, operational checks, and surveys of gauges or devices in accordance with manufacturer's instructions/recommendations.
- J. For possession and use as contamination incidental to sample analysis.
- K. For use incidental to decontamination, decommissioning, surveying, packaging, and transfer.

\*  $\mu$ Ci-microcurie; mCi-millicurie; Ci-Curie; MBq-Megabecquerel; GBq-Gigabecquerel; TBq-Terabecquerel; g-gram;  $\mu$ g-microgram; kg-kilogram

APPROVED BY:

DATE

PAGE OF PAGES

Joseph G. Klinger, Head of Licensing Section  
IL 473-0059

September 29, 1993

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IDHS.FLM-004-02 (8/91)

STATE OF ILLINOIS  
DEPARTMENT OF NUCLEAR SAFETY  
RADIOACTIVE MATERIAL LICENSE

LICENSEE	LICENSE NUMBER	AMENDMENT NUMBER	EXPIRATION DATE
Stan A. Huber Consultants, Inc.	IL-01013-01	7	November 30, 1996

AUTHORIZED USE:

- L. For possession as contamination incidental to sample analysis and, for use incidental to decontamination, decommissioning, surveying, packaging, and transfer.
- M. For possession, storage, and use as shielding. Not for distribution as defined in 32 Ill. Adm. Code 331.30.

CONDITIONS

1. A. Radioactive material listed in Items A. through H., J., L. (only for sample analysis) and M. may be stored at 200 North Cedar Road, New Lenox, Illinois and Items A. through H., J. and L. may also be used at temporary job sites of the licensee anywhere in the State of Illinois in accordance with statements, representations and procedures listed in other conditions of this license.
- B. Radioactive material listed in Items I., K., and L. shall be used only at temporary job sites of the licensee in the State of Illinois in accordance with statements, representations and procedures listed in other conditions of this license.
2. Radioactive material shall be used by, or under the supervision and in the physical presence of, Stan A. Huber or individuals who have been trained in accordance with application dated October 23, 1992 and letters, with attachments, dated January 25, 1993 and April 2, 1993. The licensee shall maintain training records of all designated users.
3. The Radiation Safety Officer for this license is Stan A. Huber.
4. A. (1) Each sealed source shall be tested for leakage and/or contamination at intervals not to exceed six months or at intervals approved by the Department, an Agreement State, a Licensing State or the U.S. Nuclear Regulatory Commission. In the absence of a certificate from a transferor indicating that a test has been made within six months prior to transfer, the sealed source shall not be put into use until tested, and results obtained.
- (2) Notwithstanding the periodic leak test required by this condition, any licensed sealed source is exempt from such leak tests when the source contains 100  $\mu$ Ci or less of beta and/or gamma emitting material or 10  $\mu$ Ci or less of alpha emitting material.
- B. The periodic leak test required by this condition does not apply to sealed sources that have been removed from use and are in protective and secure storage. The sources excepted from this test shall be tested for leakage prior to use or transfer to another person, unless they have been leak tested within six months prior to the date of use or transfer.

\*  $\mu$ Ci-microcurie; mCi-millicurie; Ci-Curie; MBq-Megabecquerel; GBq-Gigabecquerel; TBq-Terabecquerel; g-gram;  $\mu$ g-microgram; kg-kilogram

APPROVED BY:

DATE

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Joseph G. Klinger, Head of Licensing Section  
473-0059

September 29, 1993

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IDMS.FLM-004-02 (8/91)

STATE OF ILLINOIS  
DEPARTMENT OF NUCLEAR SAFETY  
**RADIOACTIVE MATERIAL LICENSE**

LICENSEE	LICENSE NUMBER	AMENDMENT NUMBER	EXPIRATION DATE
Stan A. Huber Consultants, Inc.	IL-01013-01	7	November 30, 1996

(Condition 4. continued)

- C. Leak tests shall be capable of detecting the presence of 0.005  $\mu\text{Ci}$  of radioactive material on the test sample, or in the case of radium sources, either the presence of 0.005  $\mu\text{Ci}$  of external radon-daughter contamination or the escape of radon at the rate of 0.001  $\mu\text{Ci}$  per 24 hours. The test samples shall be taken from the sealed source or from the surfaces of the device in which the sealed source is permanently or semipermanently mounted or stored upon which one might expect contamination to accumulate. Records of leak test results shall be kept in units of  $\mu\text{Ci}$  or Bq and maintained for inspection by the Department. Records of leak test results shall be maintained for Department inspection for a period of five years from the date of analysis of the test sample.
- D. If the test reveals the presence of 0.005  $\mu\text{Ci}$  or more of removable contamination, or in the case of radium sources, either the presence of 0.005  $\mu\text{Ci}$  of external radon-daughter contamination or the escape of radon at the rate of 0.001  $\mu\text{Ci}$  or greater per 24 hours, the licensee shall immediately withdraw the sealed source from use and shall cause it to be decontaminated and repaired, or to be disposed of in accordance with the 32 Ill. Adm. Code: Chapter II, Subchapters b and d. A report shall be filed within five days of the test with the Department, describing the source and equipment involved, the test results and the corrective action taken.
- E. Tests for leakage and/or contamination shall be performed by the licensee in accordance with procedures described in the letter, with attachments, dated January 25, 1993 and April 2, 1993 or by persons specifically authorized by the Department, an Agreement State, a Licensing State, or the U.S. Nuclear Regulatory Commission to perform such services.
5. Sealed source leakage or contamination tests provided as a customer service shall be conducted in accordance with the following:
- A. The conditions of pertinent Department, Agreement State, Licensing State and U.S. Nuclear Regulatory Commission licenses authorizing the customer's use and possession of the radioactive material;
- B. The procedures described in the letters, with attachments, submitted by the licensee, dated January 25, 1993 and April 2, 1993;
- C. The sealed source shall not be removed from the device. Tests shall be made with the sealed source in the shielded or "off" position; and,
- D. Prior to collection of test samples, the tester shall survey the area which will be occupied during the sample collection.

\*  $\mu\text{Ci}$ -microcurie;  $\text{mCi}$ -millicurie;  $\text{Ci}$ -Curie;  $\text{MBq}$ -Megabecquerel;  $\text{GBq}$ -Gigabecquerel;  $\text{TBq}$ -Terabecquerel;  $\text{g}$ -gram;  $\mu\text{g}$ -microgram;  $\text{kg}$ -kilogram

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Joseph G. Klinger, Head of Licensing Section  
473-0059

September 29, 1993

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IDNS,FLM-004-02 (8/91)

STATE OF ILLINOIS  
DEPARTMENT OF NUCLEAR SAFETY  
**RADIOACTIVE MATERIAL LICENSE**

LICENSEE	LICENSE NUMBER	AMENDMENT NUMBER	EXPIRATION DATE
San A. Huber Consultants, Inc.	IL-01013-01	7	November 30, 1996

6. Sealed source leak test certificates shall identify:
  - A. The radionuclide, estimated activity, model and serial number of each radionuclide tested;
  - B. The date of sample collection,
  - C. The name of the individual who collected the sample and
  - D. The date of sample analysis;
  - E. The name of the individual who performed the leak test sample analysis; and
  - F. The results of each test in units of  $\mu\text{Ci}$  or Bq.
7. The licensee is authorized to calibrate radiation survey instruments as a customer service in accordance with statements, representations and procedures listed in other conditions of this license.
8. Each radiation survey instrument calibration certificate shall include an appropriate scale correction factor each time the exposure rate indicated by the radiation survey instrument differs from the true exposure rate by more than plus or minus ten percent.
9. The licensee is authorized to perform in-house radiation survey instrument calibrations in accordance with statements, representations and procedures listed in other conditions of this license.
10. This license does not authorize commercial distribution of radioactive material.
11. The licensee shall not use radioactive material in or on humans or in applications where radioactive material is released to the environment except as provided otherwise by specific condition of this license.
12. Radioactive material shall not be used in products distributed to the general public.
13. Sealed sources containing radioactive material shall not be opened.
14. Individuals who work in, or whose duties may require them to work in restricted areas, shall be instructed in the items specified in 32 Ill. Adm. Code 400.120 at the time of initial employment and at least annually thereafter. The licensee shall maintain records of initial and annual employee training for Departmental inspection for five years from the date on which the training was given.

\*  $\mu\text{Ci}$ -microcurie; mCi-millicurie; Ci-Curie; MBq-Megabecquerel; GBq-Gigabecquerel; TBq-Terabecquerel; g-gram;  $\mu\text{g}$ -microgram; kg-kilogram

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DATE

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Joseph G. Klinger, Head of Licensing Section  
473-0059

September 29, 1993

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IDMS-FLM-004-02 (8/91)

STATE OF ILLINOIS  
DEPARTMENT OF NUCLEAR SAFETY  
**RADIOACTIVE MATERIAL LICENSE**

LICENSEE	LICENSE NUMBER	AMENDMENT NUMBER	EXPIRATION DATE
Stan A. Huber Consultants, Inc.	IL-01013-01	7	November 30, 1996

15. The licensee shall conduct a physical inventory at intervals not to exceed six months to account for each sealed source received and possessed under the license and shall maintain a record of such inventories. The inventory records shall include the radionuclide, activity, activity assay date, manufacturer, model and serial number, the location of the sealed source, date of the inventory and the identity of the individual(s) performing the inventory. Records of inventories shall be maintained for five years from the date of each inventory.
16. Except as otherwise specified in the license, the licensee shall have available and follow the instructions contained in the manufacturer's instruction manual for each device authorized by this license.
17. The licensee shall take precautions sufficient to prevent loss of each source of radiation.
18. A. The source holder shall be locked in the "off" or closed position:
  - (1) During any manipulation of a density or level gauge, including the source holder or the detector, that involves physical movement of the device and/or separation from a pipe or vessel, including installation, relocation, or storage; and
  - (2) When individuals are working on or adjacent to a density or level gauge during periods of shutdown; and
  - (3) Whenever an individual enters a vessel in which such a gauge is located; and
  - (4) Whenever a vessel with such a gauge is empty and an individual is working around the exterior of the vessel.

B. Records of each removal or relocation shall be maintained which provide certification that the source holder has been locked in the "off" or closed position, a description of each location and the dates of the relocation and removal.
19. This license does not authorize the performance of repairs or alterations to sealed irradiation sources.
20. In addition to the possession limits stated in items. A. through H., J., L, and M. the licensee shall further restrict the possession of unsealed or dispersible licensed material to quantities less than  $10^3$  times the applicable limits referenced in 32 Ill. Adm. Code Part 340 Appendix B. Radioactive material in sealed or non-dispersible form shall not exceed  $10^{10}$  times the applicable limits referenced in 32 Ill. Adm. Code Part 340 Appendix B, except those categories of licensed materials listed in 32 Ill. Adm. Code Part 330.250 (c)(5).

\*  $\mu$ Ci-microcurie; mCi-millicurie; Ci-Curie; MBq-Megabecquerel; GBq-Gigabecquerel; TBq-Terabecquerel; g-gram;  $\mu$ g-microgram; kg-kilogram

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Seph G. Klinger, Head of Licensing Section  
473-0059

September 29, 1993

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IDMS.FLM-004-02 (8/91)

STATE OF ILLINOIS  
DEPARTMENT OF NUCLEAR SAFETY  
**RADIOACTIVE MATERIAL LICENSE**

LICENSEE	LICENSE NUMBER	AMENDMENT NUMBER	EXPIRATION DATE
San A. Huber Consultants, Inc.	IL-01013-01	7	November 30, 1996

21. Except as specifically provided otherwise by the license, the licensee shall possess and use radioactive material described in all schedules of this license in accordance with statements, representations and procedures contained in, referenced in, or enclosed with the documents listed below. The regulations contained in 32 Ill. Adm. Code: Chapter II, Subchapters b and d shall govern unless the statements, representations and procedures in the licensee's application and correspondence are more restrictive than the regulations. The most recent statements, representations and procedures listed below shall govern if they conflict with previously submitted documents.

- A. Application dated October 23, 1991.
- B. Letters with attachments dated January 25, 1993, April 2, 1993, May 26, 1993, and September 7, 1993.
- C. Letter dated July 1, 1993.

JGK:CGV:sld

\*  $\mu$ Ci-microcurie; mCi-millicurie; Ci-Curie; MBq-Megabecquerel; GBq-Gigabecquerel; TBq-Terabecquerel; g-gram;  $\mu$ g-microgram; kg-kilogram

APPROVED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ PAGE 7 OF 7 PAGES

Seph G. Klinger, Head of Licensing Section  
473-0059

September 29, 1993

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397305

January 12, 1995

U.S. Department of the Army  
ATTN: Michael L. Conrad, LTC, OD  
Crane Army Ammunition Activity  
300 Crane Highway  
Crane, Indiana 47522-5099

Gentlemen:

Enclosed is Check No. 5585-80017390 (\$800) which accompanied your application for renewal of Materials License 13-18235-01.

Your application is exempt from fees as specified in \$170.11(a)(5) of 10 CFR 170 (copy enclosed).

Your application has been forwarded to the Licensing staff for processing.

Sincerely,

Signed by Shirley A. Crutchfield

Shirley Crutchfield  
License Fee and Debt Collection Branch  
Division of Accounting and Finance  
Office of the Controller

Enclosures:

1. Check No. 5585-80017390 (\$800)
2. 10 CFR 170

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VOID AFTER ONE YEAR

*L. Christensen*  
DISBURSING OFFICER

# 55858 #

@000000518: 800173902#

397905

OCT 21 1996

Michael L. Conrad, LTC, OD  
Commander  
Crane Army Ammunition Activity  
ATTN: SMCCN-SF  
300 Hwy. 361  
Crane, IN 47522-5099

Dear Mr. Conrad:

Enclosed is Amendment No. 13 renewing your NRC Material License No. 13-18235-01 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 note that: (1) Robert Gillis has not been authorized as an Alternate Radiation Safety Officer; and (2) William Patterson has not been authorized as an individual responsible for day-to-day management or supervision of the radiation safety program. In order for us to consider your requests regarding Messrs. Gillis and Patterson, it is necessary for you to submit documentation of their training and experience including a minimum of one year of actual experience as a radiographer (no credit for experience will be given for the use of x-ray devices), and the date when they were initially designated as radiographers. You may submit the information requested above as additional information to Control Number 97905.

Please be advised that your license expires at the end of the day, 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.

397905

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).
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.

M. Conrad

-3-

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, 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  
Robert G. Gattone, Jr.  
Radiation Specialist  
Nuclear Materials Licensing Branch

License No.: 13-18235-01

Docket No.: 030-14708

Enclosure: Amendment No. 13

DOCUMENT NAME: M:\03014708.CL6

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REPLY TO  
ATTENTION OF

DEPARTMENT OF THE ARMY

CRANE ARMY AMMUNITION ACTIVITY  
300 HIGHWAY 361  
CRANE INDIANA 47522-8099

September 16, 1996



Safety Office

Materials Licensing Section  
U.S. Nuclear Regulatory Commission, Region III  
ATTN: Robert Gattone  
801 Warrenville Road  
Lisle, Illinois 60532-4351

Dear Sir,

Enclosed is the response to your question asked during our phone conversation on 16 September 1996. The question pertained to Crane Army Ammunition Activity application for renewal of Nuclear Regulatory Commission License No. 13-18235-01, dated 22 November 1994, control number 97905.

If additional information is required, please contact the undersigned at (812) 854-1246.

Sincerely,

Walter F. Shearin  
Chief, Safety Office

Enclosure

RECEIVED

SEP 20 1996

REGION III

Response to Question Asked Over the Phone  
Related to 22 November 1994 Renewal Request of  
NRC License Number 13-18235-01

Question: How much time is spent on each topic of Appendix A to 10 CFR 34 during training of radiographic personnel.

Response: The following is an approximation of the amount of time spent during a typical 40 hour training session for radiographers. Assistant radiographers are required to complete one forty hour session. Radiographers are required to complete two forty hour sessions. The time would be doubled for radiographers.

<u>TOPIC</u>	<u>TIME</u>
I. Fundamentals of Radiation Safety	(15 hours)
A. Characteristics of gamma radiation.	3 hours
B. Units of radiation dose (mrem) and quantity of radioactivity (curie).	2 hours
C. Hazards of exposure to radiation.	4 hours
D. Levels of radiation from licensed material.	2 hours
E. Methods of controlling radiation dose.	4 hours
1. Working time.	
2. Working distances.	
3. Shielding.	
II. Radiation Detection Instrumentation To Be Used.	(10 hours)
A. Use of radiation survey instruments:	5 hours
1. Operation.	
2. Calibration.	
3. Limitations.	
B. Survey Techniques.	3 hours

C. Use of personnel monitoring equipment:	2 hours
1. Film badges and thermoluminescent dosimeters (TLD's).	
2. Pocket dosimeters.	
3. Alarm ratemeters.	
III. Radiographic Equipment To Be Used	(8 hours)
A. Remote handling equipment.	2 hours
B. Radiographic exposure devices.	4 hours
C. Storage containers.	2 hours
IV. Inspection And Maintenance Performed By The Radiographers	(4 hours)
V. Case Histories of Radiography Accidents	(3 hours)
	TOTAL (40 hours)



DEPARTMENT OF THE ARMY  
CRANE ARMY AMMUNITION ACTIVITY  
300 HIGHWAY 361  
CRANE INDIANA 47522-5099

September 5, 1996



REPLY TO  
ATTENTION OF

Safety Office

Materials Licensing Section  
U.S. Nuclear Regulatory Commission, Region III  
ATTN: Robert Gattone  
801 Warrenville Road  
Lisle, Illinois 60532-4351

Dear Sir,

Enclosed is the response in reference to your memorandum dated 30 July 1996. Response to questions are provided for application for renewal of Nuclear Regulatory Commission License No. 13-18235-01, dated 22 November 1994, control number 97905.

If additional information is required, please contact the undersigned at (812) 854-1246.

Sincerely,

*Walter F. Shearin*

Walter F. Shearin  
Chief, Safety Office

Attachment

RECEIVED  
SEP 09 1996  
REGION III

Response to Questions Related to  
22 November 1994 Renewal Request of NRC License 11  
Number 13-18235-01

1. Name of Applicant

Your observation is correct. The license should be issued to Crane Army Ammunition Activity (CAAA).

2. Licensed Material

a. The licensee will use the Model 590 exposure device as described in the CAAA letter dated January 9, 1996.

b. Name: Atom Therapy Service  
Address: Division of Atom Mechanical Company  
1650 East 361<sup>st</sup> Street  
Building F.  
Eastlake, Ohio 44094  
Telephone: (216) 951-0062  
License #: 34-19854-01, expiration 30 November 1999

3. Individuals Responsible for the Radiation Safety Program

a. Mr. Walter F. Shearin is the Radiation Protection Officer (RPO) for CAAA. He retains responsibility for compliance with all license requirements. Specific duties are stated under item #7 of license renewal request. In addition the RPO will be responsible for:

- (1) Personnel exposure monitoring.
- (2) Calibration of Instrumentation.
- (3) Accountability of Source Materials.
- (4) Periodic Surveys of Source.
- (5) Radiographer Testing.
- (6) Training of Radiographers/Radiographer Assistants and Co-alternate RPO.
- (7) Film Badge Program.
- (8) Accident Reporting Requirements.
- (9) Periodic Maintenance Program for Exposure Device.

(10) Internal Inspections.

(11) ALARA Program

My co-alternate RPOs are Mr. Robert D. Roach and Richard W. Murphy. Their duties are to assist the RPO in performing his required duties. They will also perform all required duties as RPO during his absence. Mr. Robert Gillis, resume enclosed (enclosure 1), will provide administrative assistance to the RPO. Mr. Gillis is not a qualified radiographer and will not supervise day-to-day operations of the radiographers or internal inspections. He will also not perform radiographer testing or training. Mr. Gillis is in training to be a radiographer and to eventually perform duties as a co-alternate RPO. His current training will allow him to conduct personnel exposure monitoring, monitor instrument calibration status, assist in accountability of source materials, and accident reporting. His work will be under direct supervision of the RPO until he has completed required training and experience to be a radiographer.

b. The Commander of CAAA changes every two years. The current commander is:

John C. King  
COL, OD  
Commanding

c. Mr. Ronald F. Tarr has considerable experience in radiography operations, but; is not currently a radiographer. Mr. Tarr provides administrative supervision of the radiographers i.e., counseling, pay, scheduling and career development. He does not supervise day-to-day operations of the radiographers. Supervision of day-to-day operations is done by a qualified level II radiographer who has completed required training and has a minimum of one year experience as a radiographer (with Co60 source).

Larry McCrary, Hiram Sanders, William Daniel, Martin McRoberts, and Donavan Sailer all have 1 year experience as radiographers as of June 1996. They are all level II certified and completed required internal training. William Patterson is still working as a radiographer assistant. He has had 1 year experience and completed level II training as of July 1996, but, has not completed level II testing requirements. He will not be responsible for day-to-day management or supervision of the radiography program until all training and testing requirements have been met. Assistant radiographers must work with a qualified radiographer at all times. Radiographers never work alone.



#### 4. Training

a. All CAAA radiographic personnel are required to be level II certified. Level I training is 40 hours and level II training is 40 hours. This is in addition to internal training requirements already covered in item seven of the license renewal submittal. A minimum of 8 hours refresher safety training is given annually. Topics of Appendix A to 10 CFR 34 are covered in the level I/II certification courses as well as internal training. Our level I and level II certification training is provided by a level III certified radiographer. Training has been provided recently by Stavely Schools for Non-Destructive Testing, a division of Conam Inspection Inc., 4000 Lockbourne Road, Columbus, OH 43207 (614)-491-3134. All of the subjects in Appendix A of 10 CFR 34 are included in the instruction and tested. Hands-on training is also included.

b. In addition to what was covered above, Mr. Walt Shearin, Mr. Robert Roach and Mr. Richard Murphy will provide required internal training. Their specific training and experience is provided in Appendix C. In addition to what is listed in Appendix C, each of these radiographers have had an additional 2 years of experience with the Picker model 590 X-ray exposure device (Cobalt-60 source) and two additional years of radiation refresher training. This has been since the license renewal request was submitted in November 1994.

c. Concur with your observation of the correct answer to question 23. Revised test is submitted with the requested changes made. See enclosure 2.

d. If an experienced radiographer is designated as a radiographer for CAAA, he will follow the same training program as a new radiographer.

#### 5. Facilities and Equipment

a. The areas on the west, east and north sides of the radiography facility are large operating bays used in the production and renovation of Naval gun ammunition, specifically 5/54" high explosive projectiles.

The bay on the north side of the radiography facility is separated from the exposure cell by an 18 inch steel reinforced concrete wall with 3 inch sliding firedoor. It is also separated by the radiography control room to include darkroom, reading room, setup area and a second 18 inch steel reinforced concrete wall which separates the control room from the exposure cell. Access to the exposure cell is gained through either of two

7 foot high wire gates which are lined with  $\frac{1}{4}$  inch lead, and interlocked to the exposure device. This interlock secures the device anytime the gates are open.

The bay on the east side of the radiography facility is separated from the exposure cell by an 18 inch steel reinforced concrete wall which extends through the attic to the gabled roof.

The bay on the west side of the radiography facility is separated from the exposure cell by an 8 inch concrete block wall which is covered with  $\frac{1}{4}$  inch lead sheeting which extends laterally the full length of the exposure cell and upward to the cell ceiling.

The area on the south side of the radiography facility is the direction of source exposure. This area consist of an 8 inch reinforced wall that is lined with  $\frac{1}{4}$  inch lead sheeting in the area of exposure. The exterior of this wall is shielded with a stack of solid concrete blocks. This stack of 8 inch blocks measures 4 feet thick by 20 feet long, and extends upward approximately 4 feet above the exposure cell ceiling. This stack of blocks is located in an 8 foot wide concrete walkway which separates the building from a concrete walkway which separates the building from a concrete reinforced earthen berm which was originally constructed as blast shielding when the facility was used for press loading 5 inch projectiles. This earthen berm is approximately 16 foot high by 25 foot deep, and runs the full length of the rear of the building. Access to the walkway in the area directly behind the exposure cell is blocked by two walls consisting of 10 inch thick, sand filled, metal containers which are stacked between the building and the earthen berm, and upward for the full height of the building.

The area below the radiography control room is accessed via a crawl space that extends under the control room, but not into the exposure cell. The area under the exposure cell consist of a concrete floor and solid earth.

The attic area above the exposure cell is accessed through a locked hatch in the ceiling of the north bay, adjacent to the control room. The keys to this area are kept in a key locker located in the radiography control room. Access to this space is only allowed when all radiography operations are suspended, and with approval of the senior radiographer. The area on the outside roof of the building directly above the exposure bay is surrounded with a waist high cable and radiation warning signs which read, "DANGER - RADIATION AREA - KEEP CLEAR", along with the magenta and yellow radiation symbol.

b. On the original Figure 1., the symbol for a rotating beacon was omitted from the drawing. The beacon is located adjacent to the gamma alarm detection unit located in the ~~21~~ exposure cell. A revised Figure 1. is enclosed (enclosure 3) which indicates the proper location of this beacon.

c. The purpose of the fenced area around the top of the earthen berm is to prevent access to the area in the walkway behind the building and the concrete berm wall, and directly behind the exposure cell. The only means of entering this space would be to climb down from the top of the earthen berm by use of a ladder or some other climbing device. This area is fenced and posted with radiation signs and rotating warning beacons. The radiation levels measured at adjacent areas is in compliance with the requirements of 10 CFR 20.1301 (a). Compliance is achieved using adequate shielding and controlled access, and is documented by initial and quarterly surveys. Access is controlled so that members of the general public are not allowed access to the production ar

ea. The overall area around building 104 is fenced and is considered a restricted area.

d. A current radiation survey was conducted of all adjacent areas of the radiography cell. Results are submitted of radiation measurements adjacent to and above the cell. Measurements below the cell cannot be taken as it is a concrete floor poured directly on the ground. A copy of the survey is enclosed (enclosure 4).

#### 6. Personnel Monitoring Equipment

a. A copy of the U.S. Army Ionizing Radiation Dosimetry Center (AIRDC) Certificate of Accreditation by NVLAP is enclosed (enclosure 5).

b. Concur with your comment. If a dosimeter goes off-scale, the film badge or TLD will be immediately sent for processing in accordance with 10 CFR 34.33(d).

c. The name of the Navy Radiac Calibration Laboratory that calibrates our pocket dosimeters is as follows:

Radiac Calibration Laboratory  
U.S. Naval Weapons Station  
Code 3024, Building 476, Bay 7  
Yorktown, VA. 23691-0160  
Telephone 804-887-4655 or 4656  
License # NRMP 08-00024-T1NP

7. Survey Instruments

a. The name of the company that calibrates and services the survey meters at Building 104 is:

Stan Huber Consultants, INC.  
200 North Cedar Road  
New Lenox, IL 60451  
Telephone 815-485-6161  
License # IL-01013-01

The name of the agency that calibrates and services the AN/PDR-77 Radiac sets is as follows:

HQ U.S. Army Test Measurement and Diagnostic  
Equipment (TMDE) Activity  
ATTN: AMSMI-TMDE-SR  
Building 5425, ROOM 50  
Redstone Arsenal, AL 35898-5400  
License # NRC 01-00-126-16  
Expiration: 28 February 2002

Instruments are Calibrated after each instrument servicing in accordance with 10 CFR 34.24.

b. A survey meter will be carried with the radiographer or assistant each time the radiography bay is entered during isotope radiography. Survey instrument will be calibrated and turned on prior to entry.

8. Internal Inspection Program

a. The CAAA will use Exhibit 1 of the Industrial Radiography Guide (enclosure 6) as a checklist and guide to evaluate and document the performance of each radiographer and radiographer's assistant on a quarterly basis. These internal inspections will be conducted by the RPO or a Co-alternate RPO. These inspections will be made on the job and unannounced. If a radiographer or radiographer assistant has not participated in a radiographic operation for more than 3 months since the last inspection, that individual's performance must be observed and recorded the next time the individual participates in a radiographic operation. Inspection records will be maintained for a minimum of 3 years.

b. Management will take swift action to correct any deficiencies cited during internal inspections, inspections by outside agencies, or routine inspections by the RPO or co-alternate RPO. Operations will be ceased if deficiencies threaten the safety and health of personnel. Radiographers or assistant radiographers found incompetent in their duties will

not be allowed to perform radiography until they have received adequate training.

9. Operating and Emergency Procedures

a. Leak Testing

Leak test samples are taken by the same vendor that does our maintenance and repair service: Stan A. Huber Consultants, INC, License # IL-01013-01. When leak test samples are collected, it is under the supervision and physical presence of, a radiographer.

b. Records

Item 12.a. on page 24 of our application should read: Records will be maintained in accordance with 10 CFR Part 34.

c. Posting

Documents will be posted in accordance with 10 CFR 21.6. A memorandum with section 206 of the Energy Reorganization Act of 1974 will be posted on the bulletin board in the X-ray facility where the Co-60 source is located. A copy of 10 CFR 21 will be maintained in the X-ray facility at building 104.

d. Handling and Use of Sealed Sources and Radiography Devices

Step-by-step procedures for operating the Model 590 exposure device is as follows:

NOTE: The Model 590 exposure device will be operated in the high energy exposure room. The exposure room is shielded so that radiographers are not exposed to greater than .05 millirem per hour when the source is exposed during radiography. The Model 590 exposure device will not be used at other locations. It is fixed in position to expose the south wall, which eliminates any possibility for accidental exposure to any adjacent area.

(1) Obtain a calibrated radiation survey meter and turn it on to monitor the radiation levels during all steps of the procedure. The key to the control console will be maintained in the possession of the lead radiographer at all times. Ensure all personnel are wearing a TLD and two pocket dosimeters.

(2) Ensure no one is in the exposure room. Test the interlocks and radiation alarms by exposing the source at the control console. Secure the source after interlocks are checked. Survey to ensure the source is returned to the shielded position.

Maintain security at all times ensuring no one enters the exposure room.

- (3) Make appropriate entries in the utilization log.
- (4) Prepare the object to be X-rayed and film for shot.
- (5) Take the object and film behind the interlocked doors to the exposure room. Monitor your survey meter as you transport the material.
- (6) Return to the control panel and ensure everyone has exited the exposure room.
- (7) Set time for preset exposure, and reset timer in accordance with standard operating procedures for the material being X-rayed. Check security to ensure everyone is accounted for and are not in the exposure room.
- (8) Actuate exposure shutter drive and expose source by pushing the button on the clock and then rotating the momentary contact key switch until the relay "click" sound is heard, then release pressure on the key. Both the red and green lights will operate until the shutter is completely rotated and the source is completely exposed; at that point only the red light will be illuminated.
- (9) If the lock on the shutter wheel has not been unlocked and positioned properly the shutter will open only partially and both red and green lights will continue to operate. It is indicated that the shutter has opened properly when the green light goes out and the red light continues to operate. This should occur six to eight seconds after actuation of the momentary contact key switch.
- (10) If both lights stay on, press firmly on the "emergency" switch bar until a click is heard.
- (11) Wait approximately eight seconds.
- (12) If the red light goes out, it is probable that the lock on the shutter wheel has either not been unlocked or not positioned properly.
- (13) Unlock and enter exposure device vault and ensure that the shutter wheel is unlocked. Relock vault, repeat 8 above, by attempting to make exposure.



(14) If both lights remain on repeat 10 above. Secure unit and report incident to supervisor and/or Radiation Protection Officer.

(15) The Cyclops' shutter closes automatically when the power is shut off. The shutter reopens when the key switch is actuated and when the button on the timer is depressed. The timer will continue its original cycle after the key switch is re-actuated. The length of the originally set exposure may be changed by using the black knob on the control console.

(16) When the timer terminates an exposure it automatically resets to duplicate the exposure. However, the red reset button must be depressed and the key switch actuated to initiate another exposure.

(17) Always approach Cyclops with a survey meter before removing exposed film to assure shutter is fully closed.

(18) Approach the Cyclops with a survey meter subsequent to the last exposure of the day to ensure that the shutter has closed: radiation levels at the surface should return to normal levels.

(19) Lock control console and return keys to key locker in viewing room of X-ray facility.

NOTE: The following are manual procedures for closing the shutter, by the RPO or co-alternate RPO if it cannot be done at the console.

(a) Turn main switch off.

(b) Using a radiation survey meter, approach the device by unlocking the door where the device is positioned. You will be approaching the Camera from the rear.

(c) Push in the shutter lock.

(d) Grasp the manual shutter wheel firmly and rotate counterclockwise until the lock is in the down or "off" position. (the "down" position is toward the aperture.)

(e) If shutter does not close, leave the cell immediately and call our licensed service technician.

(f) Secure the restricted area until the Cyclops has been repaired.

Special Instructions for above procedure:

- (1) Work quickly but safely.
- (2) Wear a film badge and two pocket dosimeters, (a dose of 50 millirem may be incurred).
- (3) Never enter field of radiation in front of device.
- (4) UNDER NO CIRCUMSTANCES SHOULD YOU REMAIN IN ROOM MORE THAN 5 MINUTES. It should take less than a minute with a dose of less than 10 millirems.

Robert S. Gillis, Safety Engineer, Alternate Radiation  
Protection Officer (ARPO), Crane Army Ammunition Activity  
(CAAA)

Training:

General:

B.S. Aerospace Engineering, Tri-State University, Angola IN,  
1989

M.S. Safety Management, Indiana University, Bloomington IN,  
1993

Radiation Specific:

Radiological Safety Course, Fort McClellan AL, 1996, 120  
hours

Experience:

ARPO, CAAA, July 1996 to Present

Robert S. Gillis, Safety Engineer, Alternate Radiation  
Protection Officer (ARPO), Crane Army Ammunition Activity  
(CAAA)

Training:

General:

B.S. Aerospace Engineering, Tri-State University, Angola IN,  
1989

M.S. Safety Management, Indiana University, Bloomington IN,  
1993

Radiation Specific:

Radiological Safety Course, Fort McClellan AL, 1996, 120  
hours

Experience:

ARPO, CAAA, July 1996 to Present

RADIOGRAPHERS' / RADIOGRAPHERS' ASSISTANT TEST

NAME \_\_\_\_\_

DATE \_\_\_\_\_

1. The Internal Inspection Program must include observation of the performance of each radiographer and radiographers' assistant at intervals not to exceed -

- A. Annually.
- B. Semi-annually.
- C. Quarterly.
- D. Monthly.

2. Inspection records on the performance of radiographers' and radiographers' assistants must be retained for -

- A. One year.
- B. Two years.
- C. Three years.
- D. Four years.

3. The door to the control room at building 104 will be kept locked and the keys in the possession of -

- A. The Rad Safe Supervisor.
- B. RPO.
- C. The Shift Radiographer.
- D. None of the above.

4. When entering the radiography bay, the radiographer is required to have -

- A. Two dosimeters.
- B. A calibrated survey instrument.
- C. A TLD.
- D. All of the above.

5. Each radiographic exposure device must have attached to it by the user a durable, legible, clearly visible label bearing the -

- A. Chemical symbol and mass number of the radionuclide in the device.
- B. Activity and the date on which this activity was last measured.
- C. Manufacturer, Model # and serial number of the sealed source.
- D. Licensee's name, address and telephone number.
- E. All of the above.

6. Radiation survey instruments shall be calibrated at intervals not to exceed -

- A. One month.
- B. Three months.
- C. Six months.
- D. One year.



7. TLD's will be changed -
- A. Daily.
  - B. Weekly.
  - C. Monthly.
  - D. Quarterly.
8. All dosimeters will be charged by a radiographer -
- A. After it has been worn.
  - B. Prior to being worn.
  - C. Dosimeters need not be charged.
  - D. They are charged automatically in the box.
9. The IM235/PD -
- A. Is another name for a pocket dosimeter.
  - B. Is the make and model of our TLD's.
  - C. Needs to be calibrated every two (2) months.
  - D. None of the above.
10. In case of an explosion at building 104, the radiographers primary objective must be -
- A. Secure and protect the source.
  - B. Evacuation of personnel and saving lives.
  - C. Notify supervisor.
  - D. Evacuate himself/herself to a safe place.

11. When entering the source bay at building 104, the first reading with the survey instrument must be made -

A. At the open door.

B. At the controls.

C. At the projector.

D. None of the above.

12. In an emergency where the radiography bay walls are undamaged and the source unaffected but the control unit is damaged, you should -

A. Inform emergency personnel.

B. Allow no entrance to radiography bay.

C. Make a survey when it is safe to do so.

D. All of the above.

E. None of the above.

13. Each sealed source (Co 60) shall be tested for leakage at intervals not to exceed -

A. Monthly.

B. Quarterly.

C. Semi-annually.

D. Annually.

E. None of the above.

14. One reason for keeping evacuated personnel together at the evacuation point (lunch room) is to -

A. Minimize spread of radioactive contamination.

B. Account for all personnel.

C. Neither of the above.

D. Both A and B.

15. The alarm rate meter must be tested \_\_\_\_\_ when operating to ensure the alarm functions (sounds) properly -

A. Daily.

B. Weekly.

C. Monthly.

D. Quarterly.

E. Semi-annually.

16. The red indicator light on the wall over the controls indicate -

A. Source has left projector and is in tube.

B. Source is in exposed position in the collimator.

C. Source is stored in projector.

D. Control crank is broken.

17. A log book must be kept showing each use of the radiographic equipment -

A. True

B. False

18. The radiographer is required to inspect the source projector, cables, etc. -

A. Every shift.

B. Daily.

C. Weekly.

D. Monthly.

19. A log book covering maintenance inspections is required

A. True.

B. False.

20. If you arrive at work and find that your survey meter is not operating properly, what should you do -

A. Complete the job quickly, while keeping a close check on your pocket dosimeter.

B. Use past experience to judge where the restricted area boundary should be and complete the job.

C. Send an assistant to obtain a new instrument while you complete the first exposure.

D. Go get a properly operating and calibrated survey meter.

21. While performing radiography, you note that your pocket dosimeter reads off scale. What should you do -

A. Recharge your dosimeter and continue working.

B. Complete your work and record the high reading in the log.

C. Follow the procedures for this in the CAAA Radiation Safety Regulation, CAAA 385-7.

D. Perform a radiation survey to make sure the radiation levels are what you expect.

E. Both C and D.

22. Who is the Radiation Protection Officer for CAAA -

23

WALT SHEARIN

23. What signs are required on the vault door at building 104 -

A. Caution Radiation Area and Danger Radioactive Material.

B. Danger Radiation Area and Caution Radioactive Material.

C. Caution Radioactive Material and Entering Radioactive Materials Area.

D. Danger High Radiation Area and Caution Radioactive Material.

E. None of the above.

24. Pocket dosimeters must be read and exposures recorded -

A. Daily.

B. Weekly.

C. Monthly.

D. Quarterly.

E. None of the above.

25. Radiation can be detected by the human senses -

A. True.

B. False.

26. Who is responsible for ensuring that unauthorized personnel are not allowed in restricted areas -

- A. Radiographer.
- B. Radiographers' Assistant.
- C. RPO.
- D. All of the above.

27. Our exposure devices may only be operated by -

- A. Inspection supervisors.
- B. Radiation safety personnel.
- C. Qualified radiographers.
- D. Any inspection personnel designated by the division manager.
- E. All of the above.

28. The main reason to perform a survey of the exposure device after the source has been retracted is to -

- A. See if the survey meter is working.
- B. Calibrate the survey meter.
- C. Check the dosimeter's performance in actual practice.
- D. Assure that the source has in fact been retracted.
- E. Comply with regulatory requirements.



29. Where are TLD's stored when not in use -

- A. Radiographer's coat pocket
- B. Building supervisor's office
- C. Radiographers keep them at all times to measure radiation exposure continuously.

D. Designated storage location in the office of the radiography facility.

30. The dosimeter you use reads in -

- A. rems per minute (rem/min).
- B. Roentgens per minute (R/min).
- C. cosmic rads per day (cr/day).
- D. Cobalt 60 per curie (Co 60/Ci).

E. Millirads per hour (mR/h).

31. A malfunctioning survey instrument -

A. Should be used for the remainder of the operation and then sent in for repair.

B. Must not be used.

C. Used but add 10 percent to the indicated reading to compensate for the malfunction.

D. All of the above.

E. None of the above.

32. CAAA's NRC license allows source operations at any location that CAAA controls -

A. True.

B. False.

33. List three people on the recall list to call in the event of an emergency involving the Cobalt source -

WALT SHEARIN (RPO)  
DALE Romk (Co Alternate RPO)  
Commander J. C. King, Col

34. A qualified radiographer can work alone during source operations -

A. True.

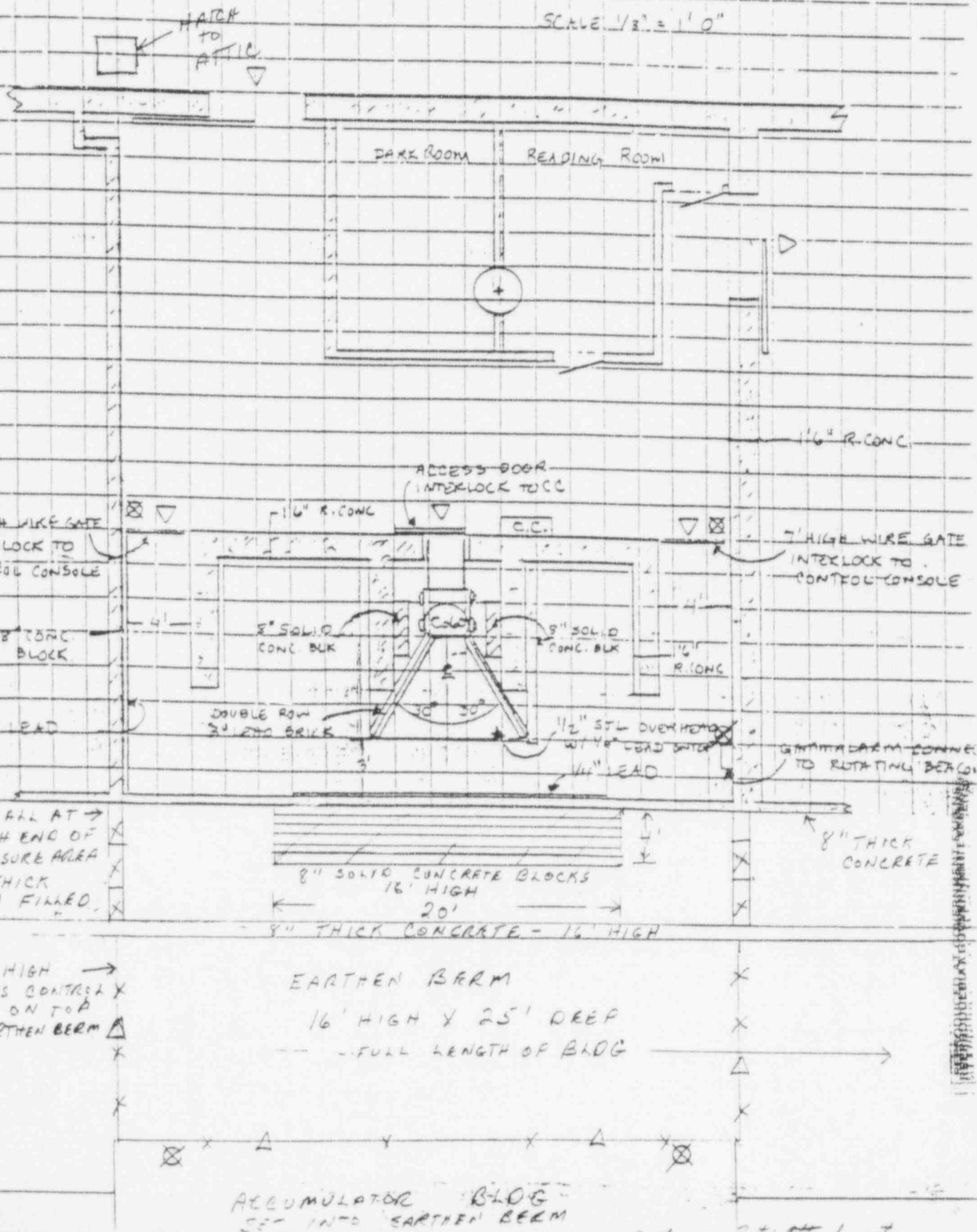
B. False.

# FIGURE 1 REVISED RADIOISOTOPE FACILITY BLDG 104

⊗ - ROTATING BEACONS

▽ - RADIATION WARNING SIGNS

SCALE 1/2" = 1' 0"



REPRODUCED AT GOVERNMENT EXPENSE

Walt J Shear RPO  
Robert D. Lach, ARPO

FIGURE 2

RADIOISOTOPES FACILITY

AN/PDR 77 RADIAC METER BLDG 104

SN 0759A

RADIATION SURVEY

CAL DATE

CO-60 SOURCE STRENGTH = 1943 Ci

10 MAY, 1996

BACKGROUND - AVG = .020 MR/HR

SCALE 1/2" = 1'0"

SURVEY POINTS - ● MR/HR

BACK  
TO  
ATTIC

● .009 MR/HR

● - HIGHEST LEVEL  
IN ATTIC OVER  
EXPOSURE CELL  
3.58 MR/HR

● - HIGHEST LEVEL  
ON ROOF OVER  
EXPOSURE CELL  
2.060 MR/HR

DARK ROOM

READING ROOM

● .019 MR/HR

● .033 MR/HR

● .050 MR/HR

● .030 MR/HR

4" HIGH WIRE GATE  
INTERLOCK TO  
CONTROL CONSOLE

4" HIGH WIRE GATE  
INTERLOCK TO  
CONTROL CONSOLE

3" CONC  
BLOCK

3" SOLID  
CONC. BLK

3" SOLID  
CONC. BLK

1/2" R. CONC

● .180 MR/HR

● .000 MR/HR

● .000 MR/HR  
TAKEN AT  
SOURCE LEVEL

● .050 MR/HR  
TAKEN AT SOURCE LEVEL

● .000 MR/HR  
TAKEN AT  
SOURCE LEVEL

8" THICK CONCRETE - 14" HIGH

7' HIGH  
ACCESS CONTROL  
FENCE ON TOP  
OF EARTHEN BERM  
● .000 MR/HR  
TOP OF  
EARTH BERM

● .080 MR/HR  
TAKEN AT TOP  
OF EARTH BERM

● .000 MR/HR  
TOP OF  
EARTH BERM

● .000 MR/HR  
INSIDE BLDG

ACCUMULATOR BLDG

National Institute  
of Standards and Technology



National Voluntary  
Laboratory Accreditation Program

ISO/IEC GUIDE 25:1990  
ISO 9002:1987

## Scope of Accreditation



Page: 1 of 1

IONIZING RADIATION DOSIMETRY

NVLAP LAB CODE 100539-0

U.S. ARMY IONIZING RADIATION DOSIMETRY CENTER (USAIRDC)

Attn: AMSMI-TMDE-SR-D, Bldg. 5417

Redstone Arsenal, AL 35898-5400

Mr. A. Edward Abney

Phone: 205-876-1786 Fax: 205-876-3816

### *Scope of Accreditation:*

This facility has been evaluated and deemed competent to process the radiation dosimeters listed below through employing a Panasonic Model 710 reader.

This facility is accredited to process the following dosimeters by virtue of actual demonstration of compliance with ANSI HPS N13.11-1993 through testing.

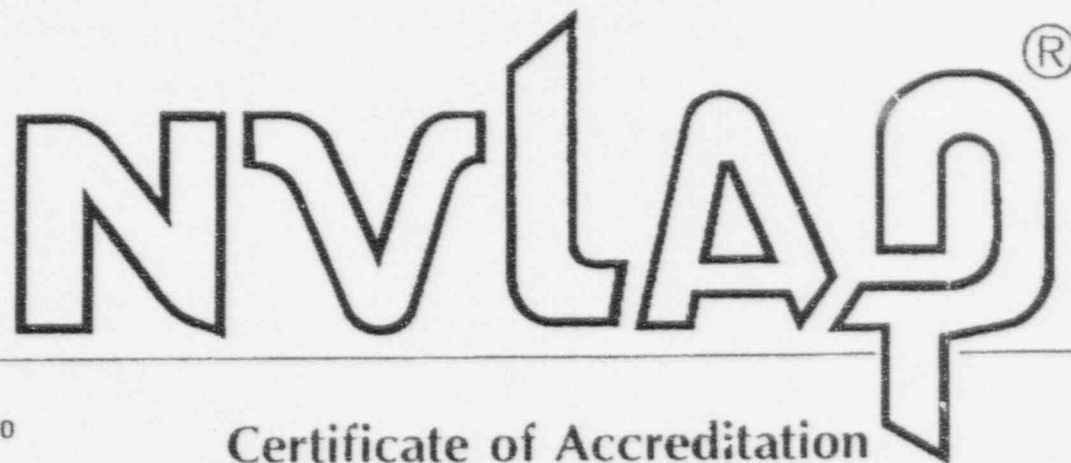
Panasonic Model UD802AS as in a Panasonic UD-874A-T holder for ANSI-N13.11 categories I, II, IIIA, IV, VA, VB, VC, VI, VII, VIII.

December 31, 1996

Effective through

For the National Institute of Standards and Technology

United States Department of Commerce  
National Institute of Standards and Technology



ISO/IEC GUIDE 25:1990  
ISO 9002:1987

Certificate of Accreditation



**U.S. ARMY IONIZING RADIATION DOSIMETRY CENTER (USAIRDC)**  
REDSTONE ARSENAL, AL

*is recognized under the National Voluntary Laboratory Accreditation Program for satisfactory compliance with criteria established in Title 15, Part 285 Code of Federal Regulations. These criteria encompass the requirements of ISO/IEC Guide 25 and the relevant requirements of ISO 9002 (ANSI/ASQC Q92-1987) as suppliers of calibration or test results. Accreditation is awarded for specific services, listed on the Scope of Accreditation for:*

**IONIZING RADIATION DOSIMETRY**

December 31, 1996

Effective through

For the National Institute of Standards and Technology  
NVLAP Lab Code: 100539-0



EXHIBIT 1

Field Radiography

Internal Inspection Checklist

Radiographic Location \_\_\_\_\_ Date \_\_\_\_\_ Time \_\_\_\_\_  
Radiographer \_\_\_\_\_ Inspector \_\_\_\_\_  
Radioisotope \_\_\_\_\_ Curies \_\_\_\_\_ Serial No. \_\_\_\_\_  
Projector Serial No. \_\_\_\_\_ Projector Model No. \_\_\_\_\_  
Survey Meter Model No. \_\_\_\_\_ Serial No. \_\_\_\_\_ Calibration Due Date \_\_\_\_\_

Yes      No

1. Was the radiographer wearing a film badge and dosimeter?
2. Were other individuals working within the restricted area wearing film badges and dosimeters?
3. Was the restricted area posted with "CAUTION (or DANGER) RADIATION AREA" signs?
4. Was the restricted area properly controlled to prevent unauthorized entry?
5. Was the high radiation area posted with "CAUTION (or DANGER) HIGH RADIATION AREA" signs?
6. Did the radiographer have a calibrated and properly operating survey meter?
7. Was the utilization log properly filled out?
8. Did the radiographer have sufficient knowledge of safety rules? (Ascertained by oral questions.)
9. Was the radiographer working with defective equipment?
10. Did the radiographer properly survey the source projector and source tube and take a radiation reading 1 foot (0.3 m) in front of the source following the radiographic exposure?
11. Were radioactive isotopes stored properly and kept locked to prevent unauthorized removal?

EXHIBIT 1, continued

Yes

No

12. Was the storage area posted with "CAUTION (or DANGER) RADIOACTIVE MATERIAL" signs?
13. Did the radiographer possess a copy of the applicant's operating and emergency procedures and, as applicable, State or NRC rules and regulations for protection against radiation?
14. Were there any items of noncompliance other than those listed on this form? (If any, explain in remarks.)

Remarks \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

# CONVERSATION RECORD

TIME  
8/14/96

DATE

13-18235-01

97905

☐ VISIT

☐ CONFERENCE

☒ TELEPHONE

☒ INCOMING

☐ OUTGOING

NAME OF PERSON(S) CONTACTED OR IN CONTACT

Walt Shearin

ORGANIZATION (OFFICE, DEPT. ETC.)

Army

TELEPHONE NO.

812-854-1246

SUBJECT

License Renewal

SUMMARY

The licensee requested an extension to the response date from 8/29/96 to 9/13/96 due to a need to respond to a deficiency letter regarding an application for a new license.

The due date extension was granted.

ACTION REQUIRED

NAME OF PERSON DOCUMENTING CONVERSATION

Bob Gattone

SIGNATURE

*Robert G. Gattone Jr.*

DATE

8/14/96

ACTION TAKEN

SIGNATURE

TITLE

DATE

JUL 30 1996

Michael L. Conrad, LTC, OD  
Commander  
Crane Army Ammunition Activity  
ATTN: SMCCN-SF  
300 Hwy 361  
Crane, IN 47522-5099

Dear Mr. Conrad:

We have reviewed your application dated November 22, 1994, requesting renewal of NRC License No. 13-18235-01 and find that we will need additional information as follows:

1. Name of Applicant

Item 2. of your application includes "Commander" as part of the applicant name. Individuals should be designated as the applicant only if the use of the byproduct material is not connected with the individual's employment with a corporation or other legal entity. It appears that this license should be issued to Crane Army Ammunition Activity. Please clarify.

2. Licensed Material

- a. Confirm that you will use your Model 590 exposure device as described in your letter dated January 9, 1996.
- b. State the name, address and license number of the firm you will use to perform quarterly maintenance checks on your Model 590 exposure device.

3. Individuals Responsible for the Radiation Safety Program

- a. It appears that more than one individual may be responsible for the duties of the Radiation Protection Officer (RPO). It is acceptable for the RPO to have assistants (e.g., "co-alternate RPOs"), however the RPO must retain responsibility for his duties. Please discuss the duties of the co-alternate RPOs and the RPO.

Alternatively, you may request an alternate RPO (ARPO). Name the individual you wish to designate as ARPO. Define the responsibilities of the ARPO and describe the parameters in which he can act for the RPO (e.g., periods when the RPO is absent).

- b. Specify the name of the Commander of the Crane Army Ammunition Activity.
- c. Individuals who are responsible for the day-to-day management or supervision of the radiography program should have a minimum of one year of actual experience as a radiographer. No credit for experience will be given for the use of x-ray devices. Therefore, specify the date when Ronald F. Tarr was initially designated as a radiographer. Additionally, confirm that Larry McCrary, Hiram Sanders, William Daniel, Martin McRoberts, Donovan Sailer and William Patterson will not be responsible for the day-to-day management or supervision of the radiography program due to their lack of one year of actual experience as a radiographer.

4. Training

- a. Specify the time spent on each topic of Appendix A to 10 CFR 34 during training of radiographic personnel.
- b. State the names of individuals who will instruct and train prospective radiographers and radiographer's assistants. Additionally, include the individuals' qualifications (i.e., where, when, and by whom they were trained in the principles of radiation and radiation safety and in the actual performance of radiography with gamma-emitting sources).
- c. Regarding the Radiographer Test in Appendix E to your application, it is necessary for you to respond to the following:
  - (1) The test should evaluate understanding of radiation safety as needed for radiographic operations. The examination should include practical questions rather than questions on radiation theory. However, questions 1, 2, 6, 13, 15, 24, 25, and 29 of your proposed written examination deal with subject matter other than that stated above. Therefore, submit a revised examination which focuses on radiation safety as needed for radiographic operations.
  - (2) Questions 4 and 5, and 10 and 26 of the test cover the same information. Therefore, replace two of them with questions that are not redundant.
  - (3) It appears that the correct answer to question 23 should be "D" in accordance with 10 CFR 20.1902. Please confirm.
- d. Confirm that an experienced radiographer to be designated as a radiographer for your company will follow your training program for new radiographers. Otherwise, submit your training program

for an experienced radiographer to be designated as a radiographer for your company. (Refer to Item 8.2 of Regulatory Guide 10.6, Revision 2)

5. Facilities and Equipment

- a. Describe the nature of the areas adjacent to the radiography facility and the distance to these areas. Include information on areas adjacent to, above, and below the cell.
- b. Item 9., page 16 of your application states that rotary beacons are on the interior of the radiography cell as shown in Figure 1. However, Figure 1 does not indicate the rotary beacons within the radiography cell. Therefore, submit a revised Figure 1 showing the locations of rotary beacons within the radiography cell.
- c. Describe the purpose of the fenced-in area adjacent to the radiography cell. Fixed radiographic facilities should not have adjacent areas which could result in an individual receiving a dose greater than those listed in 10 CFR 20.1301(a). Therefore, describe how you will assure that areas adjacent to your fixed facilities shall not exceed the levels in 10 CFR 20.1301(a).
- d. Submit results of a radiation survey of all adjacent areas of the radiography cell. Submit the results of radiation measurements adjacent to, above, and below the cell.

6. Personnel Monitoring Equipment

- a. Confirm that the U. S. Army Ionizing Radiation Dosimetry Center (AIRDC) is accredited by NVLAP.
- b. Page 10 of Appendix F to your application states that if a dosimeter goes off-scale, the RPO will send the TLD to be processed immediately only if the possibility of radiation exposure cannot be ruled out. Confirm that, if a dosimeter goes off-scale, the film badge or TLD shall be immediately sent for processing in accordance with 10 CFR 34.33(d).
- c. Provide the name, address, and license number of the firm that will calibrate your direct reading dosimeters.

7. Survey Instruments

- a. Confirm that survey instruments will be calibrated after each instrument servicing in accordance with 10 CFR 34.24.

- b. Page 12 of Appendix F to your application states that a survey meter will be carried with the radiographer or assistant each time the radiography bay is entered during isotope radiography. Confirm that the survey will be turned on prior to entry.

8. Internal Inspection Program

- a. Indicate the items to be audited during an internal inspection (reference Exhibit 1 of the enclosed Industrial Radiography Guide).
- b. Discuss management action to be taken to correct any deficiencies noted during an internal inspection.

9. Operating and Emergency Procedures

a. Leak Testing

Confirm that leak test samples are collected by, or under the supervision and physical presence of, a radiographer.

b. Records

Item 12.a. on page 24 of your application states that records will be maintained in accordance with AR 385-11 with AMCCOM Suppl 1 and AR 40-14. However, the application does not discuss the contents of the referenced documents. Therefore, confirm that you will maintain records in accordance with 10 CFR Part 34.

c. Posting

Item 13.a. on page 25 of your application does not appear to include the posting provisions outlined in 10 CFR 21.6. Therefore, confirm you will post documents in accordance with 10 CFR 21.6.

d. Handling and Use of Sealed Sources and Radiography Devices

Submit step-by-step procedures for operating the radiography device.

We will continue our review of your application upon receipt of this information. Please reply in duplicate, within 30 days, and refer to Control Number 97905.



M. Conrad

-5-

If you have any questions or require clarification on any of the information stated above, you may contact us at (708) 829-9823.

Sincerely,

Original Signed By  
Robert G. Gattone, Jr.  
Radiation Specialist

Enclosures:

1. Regulatory Guide 10.6, Revision 2
2. 10 CFR Part 34
3. 10 CFR Part 20
4. 10 CFR Part 21

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December 13, 1994

Department of the Army  
Crane Army Ammunition Activity  
ATTN: SMCCN-SF  
300 HWY 361  
Crane, IN 47522-5099

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