

MATERIALS LICENSE

Amendment No. 16

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, 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.

Licensee

1. Struthers Wells Corporation
2. 1003 Pennsylvania Avenue West
Warren, Pennsylvania 16365-0008

In accordance with application dated
December 7, 1990,
3. License number 37-11152-01 is amended in
its entirety to read as follows:

4. Expiration date November 30, 1997

5. Docket or
Reference No. 030-06249

6. Byproduct, source, and/or
special nuclear material

7. Chemical and/or physical
form

8. Maximum amount that licensee
may possess at any one time
under this license

A. Iridium 192

A. Sealed sources specified
in Condition 10.A.

A. As specified in Condition
10.A. and not to exceed
200 curies total

B. Cobalt 60

B. Sealed sources specified
in Condition 10.B.

B. As specified in Condition
10.B. and not to exceed
200 curies total

9. Authorized use

A. and B. For use in industrial radiography as specified in Condition 10. and
replacement of sources as specified in Condition 11.

CONDITIONS

10. A. Sealed iridium-192 sources and exposure devices authorized for use are as
follows:

Manufacturer &
Model No. of
Exposure Devices

Manufacturer &
Model No. of
Source Assemblies

Maximum
Activity per
Source (curies)

Amersham/Technical
Operations Model
660

Amersham/Technical Operations
Model A424-9

100

9302110497 921104
PDR ADDCK 03006249
C PDR

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MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number

37-11152-01

Docket or Reference number

030-06249

Amendment No. 16

(10. Continued)

CONDITIONS

- B. Sealed cobalt-60 sources and exposure devices authorized for use are as follows:

<u>Manufacturer & Model No. of Exposure Devices</u>	<u>Manufacturer & Model No. of Source Assemblies</u>	<u>Maximum Activity per Source (curies)</u>
Amersham/Technical Operations Model 680	Amersham/Technical Operations Model A424-14	100
Amersham/Technical Operations Model 151	Amersham/Technical Operations Model 36907	50

11. A. The following source changers may be used with the listed iridium-192 sources:

<u>Manufacturer & Model No. of Source Changers</u>	<u>Manufacturer & Model No. of Source Assemblies</u>
Amersham/Technical Operations Models 650 or AI-500 SU	Amersham/Technical Operations Model A424-9

- B. The following source changers may be used with the listed cobalt-60 sources:

<u>Manufacturer & Model No. of Source Changers</u>	<u>Manufacturer & Model No. of Source Assemblies</u>
Amersham/Technical Operations Model 771	Amersham/Technical Operations Model A424-14

12. Licensed material may be used only at the licensee's facilities at 1003 Pennsylvania Avenue, West, Warren, Pennsylvania.

13. A. Licensed material shall be used by, or under the supervision and in the physical presence of individuals who have received the training described in application dated December 7, 1990 and have been approved in writing by the Radiation Safety Officer. The licensee shall maintain records of individuals designated as users for three years following the last use of licensed material by the individual.

- B. The Radiation Safety Officer for this license is Francis J. McElroy.

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number

37-11152-01

Docket or Reference number

030-06249

Amendment No. 16

(Continued)

CONDITIONS

14. Notwithstanding the periodic leak test required by 10 CFR 34.25(b), such requirement does not apply to radiography sources that are stored and not being used. The sources excepted from this test shall be tested for leakage before use or transfer to another person.
15. 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% for iridium-192 or 10% 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.
16. Pursuant to 10 CFR 40, "Domestic Licensing of Source Material," the licensee is authorized to possess, use, transfer, and import up to 999 kilograms of uranium contained as shielding material.
17. The licensee may transport licensed material in accordance with the provisions of 10 CFR 71, "Packaging and Transportation of Radioactive Material."
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 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 December 7, 1990
 - B. Letter dated May 29, 1992

Date

NOV 04 1992

For the U.S. Nuclear Regulatory Commission

Original Signed By:

Judith A. Joustra

By

Nuclear Materials Safety Branch
Region 1

King of Prussia, Pennsylvania 19406

NOV 04 1992

License No. 37-11152-01
Docket No. 030-06249
Control No. 113838

Struthers Wells Corporation
ATTN: J. C. Wallace
President
1003 Pennsylvania Avenue, West
Warren, Pennsylvania 16365-0008

Dear Mr. Wallace:

Please find enclosed the renewal of your NRC Material License.

Please review the enclosed document carefully and be sure that you understand all conditions. If there are any errors or questions, please notify the Region I Material Licensing Section, (215) 337-5093, so that we can provide appropriate corrections and answers.

Please be advised that you must conduct your program involving licensed radioactive materials in accordance with the conditions of your NRC license, representations made in your license application, and NRC regulations. In particular, please note the items in the enclosed, "Requirements for Materials Licensees."

Since serious consequences to employees and the public can result from failure to comply with NRC requirements, the NRC expects licensees to pay meticulous attention to detail and to achieve the high standard of compliance which the NRC expects of its licensees.

You will be periodically inspected by NRC. A fee may be charged for inspections in accordance with 10 CFR Part 170. Failure to conduct your program safely and in accordance with NRC regulations, license conditions, and representations made in your license application and supplemental correspondence with NRC will result in prompt and vigorous enforcement action against you. This could include issuance of a notice of violation, or in case of serious violations, an 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, 10 CFR Part 2, Appendix C.

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ML 10

Struthers Wells Corporation

-2-

We wish you success in operating a safe and effective licensed program.

Sincerely,

Original Signed By:
Judith A. Joustra

fa Francis M. Costello, Chief
Industrial Applications Section
Division of Radiation Safety
and Safeguards

Enclosures:

1. Amendment No. 16
2. Requirements for Materials Licensees
3. NRC Forms 3 and 313
4. 10 CFR 2, 19, 20, 30, 34, 71, 170 and 171

W DRSS:RI
White/gc

10/24/92

DRSS:RI
fa Costello

10/24/92

MS 16
Q4

Struthers

Struthers Wells Corporation

P. O. BOX 8 • WARREN, PENNSYLVANIA 16365 • 814/726-1000

May 29, 1992

U. S. Nuclear Regulatory Commission
Region I
475 Allendale Road
King Of Prussia, PA 19406-1415

Attention: Mr. Paul D. Swetland, Chief, Industrial Applications Section
Division of Radiation Safety and Safeguards

Reference: Mail Control No. 113838
License No. 37-11152-01
Docket No. 030-06249

Dear Mr. Swetland:

We have reviewed the comments in your letter dated May 20, 1992 and offer the following information as you requested:

- (1) We have reviewed our renewal submission and consider the information current with the exceptions noted in Item 3 below.
- (2) The present radiation level on the roof of the building, which is outside the plant fabrication area, is approximately 80 mR/hr. The facility is monitored by a film badge on each outside wall and a film badge above the roof in an overhead crane. The radiation levels in all cases have always been less than minimum.
- (3a) We have revised Section 5 to show the proper source model number as shown on our license for our Iridium-192 source. Revised copy enclosed.
- (3b) We have revised Section 11 to address the labeling of packages for shipment that contain radioactive material. Revised copy enclosed.

Sincerely yours,

F. J. McElroy

F. J. McElroy
Quality Assurance Manager, and
Radiation Safety Officer

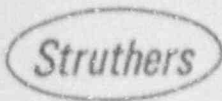
FJM/shr




Enclosures: Revised Sections 5 and 11, in duplicate, incl. Index Page

cc: Q. A. File

113838
JUN 01 1992

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NRC LICENSE RENEWALStruthersINDEX

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Struthers

SECTION 5

MATERIAL TO BE POSSESSED

SEALED SOURCES

<u>ByProduct Material</u>	<u>Source Model No.</u>	<u>Manufacturer</u>	<u>Max. Activity/Source</u>
³ A. Cobalt-60	A. 36907	A. Automation Ind.	A. 50 Curies (2)
B. Iridium-192	⁴ B. A-424-9	B. Tech/Ops	B. 100 Curies
C. Cobalt-60	C. A-424-14	C. Tech/Ops	C. 100 Curies

RADIOGRAPHIC EXPOSURE DEVICES

<u>Model Number</u>	<u>Name of Manufacturer</u>
³ A. Model 151	A. Automation Industries
B. Model 660	B. Tech/Ops
C. Model 680	C. Tech/Ops

RADIOGRAPHIC SOURCE CHANGERS

<u>Model Number</u>	<u>Name of Manufacturer</u>
³ A. N/A	A. N/A
B. 500 SU or 650	B. Automation Industries or Tech/Ops
C. 771	C. Tech/Ops

LEAK TEST KIT

A. Tech/Ops, Model 518

Struthers

SECTION 11

WASTE MANAGEMENT

The disposal of licensed material shall be in accordance with Section 20.301 of 10 CFR Part 20 and 10 CFR Part 71. This licensed material will be disposed of by returning to the original supplier or to another specific licensee authorized to possess the licensed material in accordance with the below listed instructions for labeling of packages. Certificates of these transactions shall be maintained on file by Struthers Wells Corporation.

Instructions for labeling of packages for shipment that contain radioactive materials are as follows:

- 1) Each package of radioactive material must be labeled on two opposite sides with a distinctive warning label as shown in Figure 1 below and following page.
- 2) A survey of the package shall be taken to determine which label is correct to use (Figure 1).

Figure 1

RADIOACTIVE MATERIAL PACKAGES <u>LABEL CRITERIA</u> (173.399) DOSE RATE LIMITS		
LABEL	AT ANY POINT ON ACCESSIBLE SURFACE OF PACKAGE	AT THREE FEET FROM EXTERNAL SURFACE OF PACKAGE (TRANSPORT INDEX)
"RADIOACTIVE-WHITE I"	0.5 mR/hr	0
"RADIOACTIVE-YELLOW II"	50 mR/hr	1.0 mR/hr
"RADIOACTIVE-YELLOW III" *	200 mR/hr	10 mR/hr

*Requires Vehicle Placarding

Struthers

Figure 1 (Cont'd.)

PACKAGE LABELS

RADIOACTIVE-WHITE I

RADIOACTIVE-YELLOW II

RADIOACTIVE-YELLOW III



3) For all labels, vertical bars overprinted in lower half of each label are in red. Each label is diamond shaped four inches of each side having a solid black line border one-fourth inch from the edge.

4) The applicable information as required in any blank spaces on the "RADIOACTIVE" label must be inserted by legible printing (manual or mechanical) using a durable, weather resistant means or marking to include the following:

- (a) The name of the radionuclide;
- (b) The number of curies;
- (c) The "Transport Index".

5) Packages containing radioactive materials may not be shipped from Struthers Wells Corporation without the approval of the Radiation Safety Officer.

RECEIVING REPORT



13609

JUL 17 1990

RECEIVED FROM:

THIS IS YOUR ISOTOPE RECEIPT
KEEP IT FOR YOUR RECORDS

PAGE: 1 OF 1

STRUTHERS WELLS CORP.

1003 PENN AVE W

WARREN, PA. 16365

Attn: Frank McElroy

CARRIER: FEDERAL EXPRESS

FREIGHT BILL #: 982 4810 936

PREPAID ☒ COLLECT ☐

RADIOACTIVE MATERIAL RECEIPT

MODEL # 450

SERIAL # 263

SALES ORDER # 21888

IN OVER PACK ☐

IN 715 S/N ☐
IN 6717 ☐

IN 683 S/N ☐
IN 9135 ☐

ISOTOPE:

IRIDIUM-192 ☒
CESIUM 137 ☐

COBALT 60 ☐
OTHER ☐

MODEL # 424-9

SERIAL # 5735

ACTIVITY 2.8 CURIES

MODEL #

SERIAL #

ACTIVITY CURIES

SURFACE RADIATION: 2 mR/hr

TRANSPORT INDEX: 0.1

COMMENTS:

NON-RADIOACTIVE MATERIAL RECEIPT

CODE

1 2 3 4
1 2 3 4
1 2 3 4
1 2 3 4

CODE:

1 = REPAIR/CALIBRATION

2 = C.E.R.A.

3 = AMERSHAM PROPERTY BEING RETURNED

4 = OTHER:

This form is to acknowledge that the materials listed above were received by Amersham Corporation. Please save this for your files.

RECEIVED BY: Arthur C. Leonini

CONVERSATION RECORD

TIME 10-15

DATE 2-28-92

TYPE

☐ VISIT

☐ CONFERENCE

☒ TELEPHONE

☒ INCOMING

☐ OUTGOING

ROUTING

NAME/SYMBOL INT

Location of Visit/Conference:

NAME OF PERSON(S) CONTACTED OR IN CONTACT WITH YOU

Frank McElroy

ORGANIZATION (Office, dept., bureau, etc.)

Structural Mill

TELEPHONE NO:

814-726-1000 ex 418

SUBJECT

Guests coming leaving renewal

SUMMARY

Returned phone call from 2/27/92

1. Source radiography is only performed in the linear accelerator/cobalt room. The other form for even surveys are used strictly for x-ray.

2. There is no access to the roof. I ask the licensee if rad. levels on the roof have been determined. Mr. McElroy stated that film badges are placed weekly on the overhead crane which is approx. 15' above the floor (roof is 20'!).

3. NDE supervisor is Bob Carlson. This position was indicated as one who performed internal ^{radiol} checks. Mr. McElroy stated he does the bulk of the audits with the qualified radiographer doing the balance.

ACTION REQUIRED

MS14 to address No. 2 ~~above~~ above as well as other items identified during review

NAME OF PERSON DOCUMENTING CONVERSATION

SIGNATURE

Duncan White

DATE

2-28-92

ACTION TAKEN

SIGNATURE

TITLE

DATE

MAY 20 1992

License No. 37-11152-01
Docket No. 030-06249
Control No. 113838

Struthers Wells Corporation
ATTN: F. J. McElroy
Radiation Safety Officer
P. O. Box 8
1003 Pennsylvania Avenue, West
Warren, Pennsylvania 16365-0008

Dear Mr. McElroy:

This is in reference to your application dated December 1990 to renew License No. 37-11152-01. In order to continue our review we need the following additional information:

1. Because of our delay in processing your renewal application, we request that you review your renewal submission for any updating that may be required and provide the necessary revision and/or additions.
2. Please indicate what radiation levels are present on the roof of your permanent radiographic facility. If physical measurement is not possible then calculations may be used. Radiation levels must be less than 100 mR/hr on the roof. If levels are less than 100 mR/hr but greater than 2 mR/hr then your present described controls may be adequate. If it is necessary to limit exposure device orientation or time of use to maintain the roof at less than 100 mR/hr then specify these administrative controls that you will use.
3. Your operating procedures should include instructions addressing the labeling of packages for shipment that contain radioactive materials. It is not acceptable to merely reference DOT regulations. Please submit instructions that will be incorporated into your operating procedures on how to determine which label (Radioactive White I, Radioactive Yellow II, or Radioactive Yellow III) is correct to use based on a package survey.

We will continue our review upon receipt of this information. Please reply in duplicate to my attention at the Region I office and refer to Mail Control No. 113838. The reviewer for this licensing action is Duncan White. If you have any technical questions regarding this deficiency letter please call the reviewer at (215) 337-5042.

OFFICIAL RECORD COPY

ML 148 WHITE - 0001.G.0
03/10/92

ML 10

In order to continue prompt review of your application, we request that you submit your response to this letter within 30 calendar days from the date of this letter.

Sincerely,

Original Signed By:
Paul D. Swetland

Paul D. Swetland, Chief
Industrial Applications Section
Division of Radiation Safety
and Safeguards

RI:DRSS
White/eb

3/11/92

RI:DRSS
Swetland

3/15/92

OFFICIAL RECORD COPY

ML 148 WHITE - 0002.0.0
03/10/92



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PENNSYLVANIA 19406

FEB 14 1991

DOCKET NO. 030-06249
LICENSE NO. 37-11152-01
CONTROL NO. 113838

Struthers Wells Corporation
ATTN: F. J. McElroy
Radiation Safety Officer
P.O. Box 3
Warren, PA 16365

SUBJECT: LICENSE RENEWAL APPLICATION

Gentlemen:

This is to acknowledge receipt of your application for renewal of material(s) license identified above. Your application is deemed timely filed, and accordingly, the license will not expire until final action has been taken by this office.

Any correspondence regarding the renewal application should reference the control number specified and your license number.

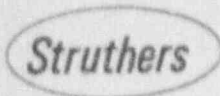
Sincerely,
Original Signed By:
Sheryl Villar
Licensing Assistant Section
Division of Radiation Safety
and Safeguards

MAJ
02/13/91
50
2/14/91

OFFICIAL RECORD COPY

ML 10

030-06249



Struthers Wells Corporation

P. O. BOX 8 • WARREN, PENNSYLVANIA 16385 • 814/726-1000

December 7, 1990

U. S. Nuclear Regulatory Commission, Region I
Nuclear Materials Safety Section B
475 Allendale Road
King Of Prussia, PA 19406

Reference: License No. 37-11152-01 & Amendments #1 thru #15

Subject: License Renewal with Application and Fee

Gentlemen: *

Enclosed please find our application renewal for license referenced above. The application and procedures have been revised/updated to comply with the Regulatory Guide 10.6.

Please feel free to call if you have any questions on the procedures or application.

Sincerely yours,

F. J. McElroy /shr

F. J. McElroy
Quality Assurance Manager, and
Radiation Safety Officer

RECEIVED
JAN -8 AM 10:00

ENCLOSURES (2 Copies of Application & Procedures)
(Check for \$320.00)

FJM/shr

cc: Q.A. File

20 DEC 11 AM '90

License Fee Information
on Application

113838

OFFICIAL RECORD COPY ML 10

DEC 11 1990

StruthersNRC LICENSE RENEWALINDEX

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Section 11	Waste Management

113338

APPLICATION FOR MATERIAL LICENSE

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.

APPLICATIONS FOR DISTRIBUTION OF EXEMPT PRODUCTS FILE APPLICATIONS WITH:

U.S. NUCLEAR REGULATORY COMMISSION
DIVISION OF FUEL CYCLE AND MATERIAL SAFETY, NMSS
WASHINGTON, DC 20066

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:

U.S. NUCLEAR REGULATORY COMMISSION, REGION I
NUCLEAR MATERIALS SAFETY SECTION B
475 ALLENDALE ROAD
KING OF PRUSSIA, PA 19406

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

U.S. NUCLEAR REGULATORY COMMISSION, REGION II
NUCLEAR MATERIALS SAFETY SECTION
101 MARIETTA STREET, SUITE 2900
ATLANTA, GA 30323

IF YOU ARE LOCATED IN:

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

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

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

U.S. NUCLEAR REGULATORY COMMISSION, REGION IV
MATERIAL RADIATION PROTECTION SECTION
611 RYAN PLAZA DRIVE, SUITE 1000
ARLINGTON, TX 76011

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

U.S. NUCLEAR REGULATORY COMMISSION, REGION V
NUCLEAR MATERIALS SAFETY SECTION
1450 MARIA LANE, SUITE 210
WALNUT CREEK, CA 94596

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 JURISDICTION.

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

- ☐ A. NEW LICENSE
☐ B. AMENDMENT TO LICENSE NUMBER _____
☒ C. RENEWAL OF LICENSE NUMBER 37-11152-01 Am. #15

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

Struthers Wells Corporation
1003 Pennsylvania Avenue West
Warren, PA 16365-0008

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

Permanent Facility for Industrial Radiography: 1003 Pennsylvania Avenue West
Warren, PA 16365-0008

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

Francis J. McElroy, RSO

TELEPHONE NUMBER

814-726-1000 Ext. 418

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.

See Section 5

6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED

Industrial Radiography

7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING AND EXPERIENCE

See Section 7

8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS

See Sections 8 and 8A

9. FACILITIES AND EQUIPMENT

See Section 9

10. RADIATION SAFETY PROGRAM

See Section 10

11. WASTE MANAGEMENT

See Section 11

12. LICENSEE FEES (See 10 CFR 170 and Section 170.31)

FEE CATEGORY 3.0 Byproduct AMOUNT ENCLOSED \$320.00
Material

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, 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.

SIGNATURE - CERTIFYING OFFICER

TYPED/PRINTED NAME

TITLE

DATE

J. C. Wallace

President

12-7-90

FOR NRC USE ONLY

TYPE OF FEE <u>REN</u>	FEE LOG <u>See P</u>	FEE CATEGORY <u>30</u>	COMMENTS	APPROVED BY <u>AK</u>
AMOUNT RECEIVED <u>\$320 + 1080</u>	CHECK NUMBER <u>10-234510-634521</u>			DATE <u>2/13/91</u>

Struthers

SECTION 5

MATERIAL TO BE POSSESSED

SEALED SOURCES

<u>ByProduct Material</u>	<u>Source Model No.</u>	<u>Manufacturer</u>	<u>Max. Activity/Source</u>
A. Cobalt-60	A. 36907	A. Automation Ind.	A. 50 Curies (2)
B. Iridium-192	B. 866	B. Tech/Ops	B. 100 Curies
C. Cobalt-60	C. A-424-14	C. Tech/Ops	C. 100 Curies

RADIOGRAPHIC EXPOSURE DEVICES

<u>Model Number</u>	<u>Name of Manufacturer</u>
A. Model 151	A. Automation Industries
B. Model 660	B. Tech/Ops
C. Model 680	C. Tech/Ops

RADIOGRAPHIC SOURCE CHANGERS

<u>Model Number</u>	<u>Name of Manufacturer</u>
A. N/A	A. N/A
B. 500 SU or 650	B. Automation Industries or Tech/Ops
C. 771	C. Tech/Ops

LEAK TEST KIT

A. Tech/Ops, Model 518

Struthers

SECTION 6

PURPOSE FOR WHICH LICENSED MATERIAL WILL BE USED

This licensed material will be used for the purpose of industrial radiography.

Struthers

SECTION 7

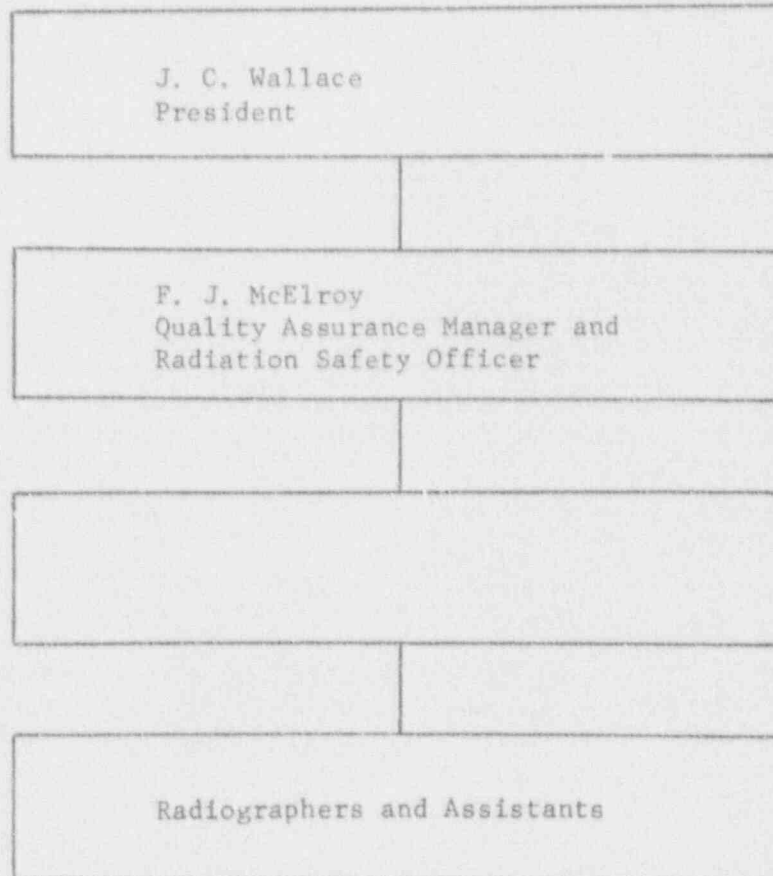
ORGANIZATIONAL STRUCTURE
FOR
RADIATION SAFETY PROGRAM

The Manager of Quality Assurance and Radiation Safety Officer (F. J. McElroy) has Management's responsibility for operation of this program. (See Page 2.)

The Radiation Safety Officer has Management's responsibility for training and supervising radiographic personnel. 3

Radiographic Operators have direct responsibility for strictly following the safety guidelines that have been established in this program.

The following is a chart of organizational responsibility to carry out provisions of Title 10, Parts 30 and 31, of NRC License requirements:



3

Struthers

SECTION 7

DUTIES OF QUALITY ASSURANCE MANAGER
AND
RADIATION SAFETY OFFICER

- A. Serving as the licensee's liaison officer with the Nuclear Regulatory Commission on license matters.
- B. Maintaining control of procurement and disposal of licensed material.
- C. Developing and maintaining up-to-date operating and emergency procedures.
- D. Establishing and maintaining a personnel monitoring program.
- E. Procuring and maintaining radiation survey instruments.
- F. Establishing and conducting the training program for radiographers and radiographers' assistants.
- G. Examining and determining competence of radiographic personnel.
- H. Establishing and maintaining storage facilities.
- I. Maintaining exposure devices, radiography facilities and associated equipment.
- J. Establishing and maintaining the licensee's record keeping system.
- K. Reviewing and ensuring maintenance of those records kept by others.
- L. Assuming control and instituting corrective action in emergency situations.
- M. Investigating the cause of incidents and determining necessary preventive action.
- N. Acting in an advisory capacity to the licensee's management and radiography personnel.

Struthers

SECTION 7

INSTRUCTOR'S AND ORGANIZATIONAL PERSONNEL QUALIFICATIONS

F. J. McElroy--Instructor and Radiation Safety Officer has over twenty (20) years experience in radiation and radiation safety. Experience includes two (2) years at U.S. Army SM-1 Nuclear Power Plant and numerous courses in radiation, including Kodak School of Industrial Radiography. Also, a qualified Examiner in Radiography for Naval Sea Systems Command and SNT-TC-1A.

3

C. H. Rowles--Radiographic Operator has twenty (20) years of radiation experience in conducting radiation surveys and leak tests. He has a certificate in radiation safety and completed Struthers Wells Radiographic Training Program. Also, he is a qualified Operator in Radiography for Naval Sea Systems Command and SNT-TC-1A.

Struthers

SECTION 8

TRAINING PROGRAM FOR RADIOGRAPHERS

The detailed Struthers Wells Training Program for Radiographers outlines the following major areas of coverage:

- A. Training Program Outline (Radiographers)
- B. On-The-Job Training (Radiographers)
- C. Training of Experienced Radiographers
- D. Periodic (Refresher) Training (Radiographers)
- E. Testing Procedures (Radiographers)
- F. Records (Radiographers)

Struthers

SECTION 8

TRAINING PROGRAM OUTLINE (RADIOGRAPHERS)

The following Training Program Outline is intended to provide instruction in the subjects outlined in Appendix A of 10 CFR Part 34. It provides a detailed outline of each item and the amount of time spent on each item.

Struthers Wells Corporation will not permit any individual to act as a Radiographer until such individual:

- a. Has been instructed in the subject outlined in Appendix A of 10 CFR Part 34;
- b. Has received copies of and instruction in NRC regulations contained in 10 CFR Part 34 and in the applicable sections of Parts 19 and 20, NRC License under which the Radiographer will perform radiography, and Struthers Wells Operating and Emergency Procedures;
- c. Has demonstrated to the Radiation Safety Officer competence to use the Struthers Wells radiographic exposure devices, sealed sources, related handling tools, and survey instruments; and
- d. Has demonstrated understanding of the above instructions by successful completion of a written test and a field examination on the subjects covered.

Struthers

SECTION 8

A. TRAINING PROGRAM OUTLINE (RADIOGRAPHERS)

I. RADIATION (10 HOURS INSTRUCTION)

A. Structure of the atom

1. Neutron, proton, electron
2. Atomic weight, number
3. Periodic table
4. Isotopes

B. Natural radioactivity

1. Disintegration mechanism
 - a. Alpha-ray emission
 - b. Beta-ray emission
 - c. Gamma-ray emission
2. Half-life
3. Isotope formation in the disintegration process

C. Production of artificial radioactive materials

1. The nuclear reactor
2. Neutron flux
3. Production of irradiated isotopes
4. Irradiation time as compared to half-life
5. Shape of sources
6. Encapsulation
7. Physical condition of source material
8. Fission products

Struthers

SECTION 8

A. TRAINING PROGRAM OUTLINE (RADIOGRAPHERS) (Continued)

II. FUNDAMENTALS OF RADIATION SAFETY (20 HOURS INSTRUCTION)

- A. Characteristics of gamma radiation
- B. Units of radiation dose (mR) and quantity of radioactivity (Curie)
- C. Hazards of exposure to radiation
- D. Levels of radiation from licensed material
- E. Method of controlling radiation dose
 - 1. Working time
 - 2. Working distance
 - 3. Shielding

III. RADIATION DETECTION INSTRUMENTATION TO BE USED (20 HOURS INSTRUCTION)

- A. Use of radiation survey instruments
 - 1. Operation
 - 2. Calibration
 - 3. Limitations
- B. Survey instruments
- C. Use of personnel monitoring equipment
 - 1. Film badges.
 - 2. Pocket dosimeters

IV. RADIOGRAPHIC EQUIPMENT TO BE USED (15 HOURS INSTRUCTION)

- A. Remote handling equipment
- B. Radiographic exposure devices
- C. Storage containers

V. INSPECTION AND MAINTENANCE PERFORMED BY RADIOGRAPHERS (10 HOURS INSTRUCTION)

VI. CASE HISTORIES OF RADIOGRAPHY ACCIDENTS (5 HOURS INSTRUCTION)

Struthers

SECTION 8

ON-THE-JOB TRAINING (RADIOGRAPHERS)

The training period consists of eighty (80) hours of initial classroom training, a minimum of three (3) months on-the-job training for individuals with no previous experience in radiography, a minimum of three (3) months on-the-job training in the use of radiographic equipment by the performance of radiographic operations under the direct supervision of the fully qualified radiographic operator. Until such time as the above requirements are completed, no trainee will be qualified as a Radiographer.

Struthers

SECTION 8

TRAINING OF EXPERIENCED RADIOGRAPHERS


Experienced personnel shall be required to complete a minimum of twenty (20) hours of classroom training related to Struthers Wells specific work program and equipment and a minimum of two (2) weeks performing radiographic operations under the direct supervision of a fully qualified radiographic operator.

The competency of the above individual to use radiographic equipment and his understanding of Struthers Wells Operating and Emergency Procedures is determined by the same test examination given to qualify individuals as Radiographers.

Struthers

SECTION 8

PERIODIC (REFRESHER) TRAINING (RADIOGRAPHERS)

Each Radiographer is given annual sessions to review new regulations, procedures, policies and equipment. Equipment functioning and maintenance is also reviewed. 

Case histories of radiographic accidents distributed by the NRC are also reviewed during the above sessions.

Internal Audit--Each Radiographer shall be audited by the Radiation Safety Officer once every three (3) months to ensure they are performing radiographic operations in accordance with NRC regulations, license conditions and Struthers Wells Operating and Emergency Procedures.

Struthers

SECTION 8

TESTING PROCEDURES (RADIOGRAPHERS)

Individuals qualifying as Radiographers must demonstrate their understanding of the instructions contained in the formal classroom training by successful completion of written and field examinations on the subjects covered. A grade of 80% is required for passing. Any items missed on the examination shall be immediately reviewed with the individual before he is qualified.

The written examination consists of a minimum of fifty (50) questions covering all items in Appendix A of 10 CFR Part 34. Both examination tests enclosed (Procedures 1 and 2) are required to be given for a Radiographer. The field demonstration consists of a practical test witnessed by the Radiation Safety Officer which includes survey of the camera, facility, assembly and disassembly of the equipment and proper storage of the equipment.

SECTION 8

(Procedure 1)

TEST FOR RADIOGRAPHERS

Name _____ Date _____ Grade _____

1. Cobalt-60 used in nondestructive examinations emit:
 - a. alpha particles.
 - b. neutrons.
 - c. gamma rays.
 - d. x-rays.
2. Lead is frequently employed in shielding against radiation from x-ray and gamma ray sources because of its:
 - a. extremely low cost.
 - b. high absorption for a given thickness and weight.
 - c. ability to emit electrons when irradiated.
 - d. ability to diffract alpha particles.
3. The time required for one half of the atoms in a particular sample of radioactive material to disintegrate is called:
 - a. the inverse square law.
 - b. a curie.
 - c. a half life.
 - d. the exposure time.
4. What does the term R/hr refer to when speaking of intensity?
 - a. Radiation limits for humans.
 - b. Roentgens per hour.
 - c. X-rays per hour.
 - d. Radiation in hydrogen.
5. Upon completing an x-ray exposure and turning the equipment off:
 - a. personnel should wait for a few minutes before entering the exposure area.
 - b. personnel should wear a lead-lined apron before entering the exposure area.
 - c. personnel may enter the exposure area without fear of radiation exposure.
 - d. personnel should take a reading with a Geiger counter before entering the exposure area.

SECTION 8

(Procedure 1)

TEST FOR RADIOGRAPHERS (Cont'd.)

6. The most widely used unit of measurement for measuring the rate at which the output of a gamma ray source decreases is the:
 - a. curie.
 - b. Roentgen.
 - c. half life.
 - d. MEV.
7. Small amounts of exposure to x-rays or gamma rays:
 - a. will have a cumulative effect which must be considered when monitoring for maximum permissible dose.
 - b. will be beneficial since they build up an immunity to radiation poisoning.
 - c. will have no effect on human beings.
 - d. will have only a short-term effect on human tissues.
8. A dose of _____ would be dangerous, if not fatal, if applied to the entire body in a short period of time.
 - a. 1.5 to 15 R.
 - b. 25 to 70 R.
 - c. 200 to 800 R.
 - d. All of the above doses would most likely be fatal.
9. When doing gamma ray radiography with high-intensity emitters, the sources are best handled:
 - a. directly by personnel equipped with special protective clothing.
 - b. by remote handling equipment which permits the operator to remain several yards away at all times.
 - c. directly by personnel with special protective clothing except when radiographs are being made.
 - d. by the same methods used for low-intensity emitters.
10. A Cobalt-60 capsule will have a half-life of:
 - a. 1.2 years.
 - b. 6 months.
 - c. 5.3 years.
 - d. 75 days.
11. Overexposure to x-rays or gamma rays may cause damage to human:
 - a. blood tissue.
 - b. skin.
 - c. internal organs.
 - d. all of the above.

SECTION 9

(Procedure 1)

TEST FOR RADIOGRAPHERS (Cont'd.)

12. A general rule used to define the amount of radiation exposure that is excessive is:
- although small amounts of radiation (0.4 R per week or less) are beneficial since they build up an immunity to these rays, anything above 0.4 R per week is excessive.
 - any dose over 5 R per week is excessive.
 - any dose which causes a mid-range reading on a Geiger counter is excessive.
 - any unnecessary exposure to radiation is excessive.
13. Materials which are exposed to gamma radiation or to x-rays below a few million volts:
- should not be handled for at least 3 minutes after exposure has ceased.
 - should be stored in a lead-lined room.
 - will not be dangerous to handle after exposure to radiation has ceased.
 - should be monitored by means of a Geiger counter.
14. A densitometer is:
- a meter used to measure x-ray intensity.
 - an instrument for measuring film density.
 - a meter used to measure the density of a material.
 - a meter used to measure tube current.
15. The radiation quality of a gamma-ray source is:
- determined by the size of the focal spot.
 - determined by the isotope involved.
 - can be varied by the operator.
 - is greater in Iridium-192 than in Cobalt-60.
16. A curie is the equivalent of:
- .001 millicuries.
 - 1,000 millicuries.
 - 1,000 megacuries.
 - 100 megacuries.
17. A primary disadvantage of the fountain-pen type of ionization chamber used to measure the amount of radiation received by personnel is:
- the delay necessary before the results of a measurement are known.

SECTION 8

(Procedure 1)

TEST FOR RADIOGRAPHERS (Cont'd.)

- b. the inaccuracy of such devices in measuring scatter radiation.
 - c. the inability of such a device to provide a permanent record of exposure.
 - d. the cost of recharging such devices.
- 18. The exposure of personnel to x- and gamma-radiation can be determined by means of:
 - a. film badges.
 - b. dosimeters.
 - c. radiation meters.
 - d. all of the above.
- 19. Short wavelength electromagnetic radiation produced during the disintegration of nuclei of radioactive substances is called:
 - a. x-radiation.
 - b. gamma radiation.
 - c. scatter radiation.
 - d. back scatter radiation.
- 20. An advantage of the fountain-pen type of ionization chamber used to monitor radiation received by personnel is:
 - a. it provides a permanent record of accumulated dosage.
 - b. it provides an immediate indication of dosage.
 - c. it is the most sensitive detector available.
 - d. all of the above are advantages.
- 21. The intensity of x-radiation is measured in:
 - a. Roentgens.
 - b. ergs.
 - c. Roentgens per unit of time.
 - d. H & D units.
- 22. A Cobalt-60 gamma-ray source has an approximate practical thickness limit of:
 - a. 2-1/2 inches of steel or its equivalent.
 - b. 4 inches of steel or its equivalent.
 - c. 7-1/2 inches of steel or its equivalent.
 - d. 11 inches of steel or its equivalent.
- 23. The fact that gases, when bombarded by radiation, ionize and become electrical conductors make them useful in:
 - a. x-ray transformers.
 - b. x-ray tubes.
 - c. masks.
 - d. radiation detection equipment.

SECTION 8

(Procedure 1)

TEST FOR RADIOGRAPHERS (Cont'd.)

24. The gamma ray intensity at one foot from a one curie source of radioactive Cobalt-60 is nearest:
- a. 15 Roentgens per hour.
 - b. 1,000 Roentgens per hour.
 - c. 1 Roentgen per minute.
 - d. 10 milliRoentgens per day.
25. Of the following, the source providing the most penetrating radiation is:
- a. Cobalt-60.
 - b. 220 kvp x-ray tube.
 - c. 15 megavolt betatron.
 - d. electrons from Iridium-192.
26. Which of the following isotope has the longest half-life?
- a. Thulium-170.
 - b. Cobalt-60.
 - c. Iridium-192.
 - d. Cesium-139.
27. Almost all gamma radiography is performed with:
- a. natural isotopes.
 - b. artificially produced isotope.
 - c. radium.
 - d. Thulium-170.
28. The specific activity of Cobalt-60 depends on:
- a. the time the material has been in the atomic pile.
 - b. the atomic number of the material.
 - c. the quality of the non-activated material.
 - d. the Young's Modulus value of the material.
29. If an exposure time of 60 seconds and a source-to-film distance of 4 ft. is necessary for a particular exposure, what exposure time would be needed for an equivalent exposure if the source-to-film distance is changed to 5 ft.?
- a. 75 sec.
 - b. 94 sec.
 - c. 48 sec.
 - d. 38 sec.

SECTION 8

(Procedure 1)

TEST FOR RADIOGRAPHERS (Cont'd.)

30. If it was necessary to radiograph a 7" thick steel product, which of the following gamma-ray sources would most likely be used?
- a. Cobalt-60.
 - b. Thulium-170.
 - c. Iridium-192.
 - d. Cesium-137.

SECTION 8

(Procedure 1)

ANSWERS TO TEST FOR RADIOGRAPHERS

- | | |
|------------|-------|
| 1. c | 16. b |
| 2. b | 17. c |
| 3. c | 18. d |
| 4. c | 19. b |
| 5. c and d | 20. b |
| 6. c | 21. c |
| 7. a | 22. c |
| 8. c | 23. d |
| 9. b | 24. a |
| 10. c | 25. c |
| 11. d | 26. d |
| 12. d | 27. b |
| 13. c | 28. a |
| 14. b | 29. b |
| 15. a | 30. a |

SECTION 8

(Procedure 2)

TEST FOR RADIOGRAPHERS

Name _____ Date _____ Grade _____

1. Why does greater distance from a gamma emitter lessen exposure received?
2. What is the weekly permissible radiation dose allowed?
Daily dose?
3. How is energy of a gamma source measured?
4. What harm can an excessive dose of radiation do to the human body?
5. What is the level of radiation of Cobalt 60 from a 1 Curie source at 1 ft.?
6. What is the level of radiation of Iridium 192 from a 1 Curie source at 1 ft.?
7. What is the level of radiation of Radium 226 from a 1 Curie source at 1 ft.?
8. How does working time affect radiation dose if all other factors are equal?

SECTION 8

(Procedure 2)

TEST FOR RADIOGRAPHERS (Cont'd.)

9. How does working distance affect radiation dose if all other factors are equal?
10. What are some of the good shielding materials used in controlling radiation dose?
11. What is the purpose of our Victoreen survey meter?
12. How would you calibrate our Victoreen survey meter?
13. What would you do if you entered radiation area and your meter read at its maximum?
14. When starting a day's work, what is the first thing the operator must do?
15. At what survey meter reading must an area be roped off?
16. Why do we wear film badges?
17. Why do we wear pocket dosimeters?
18. Give a brief description of the mechanics of Gamma Radiographic equipment.

SECTION 8

(Procedure 2)

TEST FOR RADIOGRAPHERS (Cont'd.)

19. What is the most important fact we have to remember about our storage containers?
20. For what purpose are we using the radioactive isotope?
21. Will our radioactive isotope cause radioactivity on objects we plan to gamma ray?
22. In case of an emergency, whom do you notify?
23. Where is the proper storage area for our radioactive isotopes?
24. How does our Gamma Alarm work?
25. What is a sealed source?
26. How will we prevent tampering or removal of by-product material by unauthorized personnel?
27. Assume that the Isotope has become stuck with the source out somewhere in the tube. What should you do?

SECTION 8

(Procedure 2)

TEST FOR RADIOGRAPHERS (Cont'd.)

28. List necessary safety equipment for radiography?
29. Geiger type survey meters are designed to record higher or lower readings than our Victoreen Survey meter?
30. Would you allow any of your fellow workers to examine and use the isotope if they asked you?
31. What are some the things we should avoid when handling a survey meter?

PROBLEMS

32. What is the Half Value Layer for:
 - a. Iron using Iridium 192
 - b. Copper using Radium 226
33. What is the Radiation output with 10 Curies of Cobalt 60 at 10 ft. from the source.

SECTION 8

(Procedure 2)

TEST FOR RADIOGRAPHERS (Cont'd.)

34. What would be the distance in feet required to reduce Radiation intensity to 50 mr/hr for 20 Curies of Cobalt 60.

35. If I_1 without shielding, is 30,000 mr/hr and I_2 with shielding is 15 mr/hr, what is the reduction factor and thickness of lead required. Assume Cobalt 60 as the source.

36. If the shielded radiation level is 5.32 mr/hr at a distance of five (5) ft for 1 curie of Cobalt 60, what is the unshielded radiation level at five (5) ft. and what thickness of concrete was used to reduce this unshielded radiation level.

SECTION 8

(Procedure 2)

ANSWERS TO TEST FOR RADIOGRAPHERS

1. The greater the distance from a gamma emitter, the less exposure to radiation.
See Inverse Square Law.
2. Weekly average = 100 mR/hr $\frac{5000 \text{ mR/hr per year}}{50 \text{ weeks}} = 100 \text{ mR/hr}$
Daily average = 20 mR/hr $\frac{100 \text{ mR/hr per week}}{5 \text{ days}} = 20 \text{ mR/hr}$
3. Survey meter which measures R/hrs and mR/hrs.
4. Effects blood forming organs.
5. 13.31 to 14.5 R/hr at 1 foot.
6. 5.9 R/hr at 1 foot.
7. .027 R/hr at 1 foot.
8. The shorter the time spent in radiation area, the less radiation absorbed.
9. See answer No. 1.
10. Lead screens, concrete walls, etc.
11. To measure quantity of radiation in mR/hrs.
12. Turn dial from "off" position to "on". Allow survey meter to warm up for a few minutes. Adjust meter by turning knob until needle indicates "0".
13. Quickly leave to safe area, secure a safe boundary around area, alert radiation officer.
14. A. Wear film badge.
B. Wear a calibrated pocket dosimeter.
C. Survey (with meter) whether source is in storage container.
15. 2 mR/hr.
16. To record weekly accumulation of exposure to radiation.
17. In case of accident, to immediately monitor amount of exposure to radiation.
18. The storage container (camera) provides shielding from radiation, the source tube guides the source to a position; a crank assembly to move the source from the camera through the tube remotely.
19. That the Isotope is in the storage container when it should be there.
 - A. Between exposures.
 - B. Locked when not in use and in designated storage area.

(Procedure 2)

SECTION 8

ANSWERS TO TEST FOR RADIOGRAPHERS (Cont'd.)

20. Radioactive Isotopes are ideal for industrial radiography of thick metal specimens.
21. No. Since radioactive Isotopes give off Gamma waves, radiation is not present after source is withdrawn.
22. Your Radiation Safety Supervisor.
23. In designated area in Lineac Room under lock and key.
24. Gamma alarm has one (1) flashing light and loud horn. When radiation intensity exceeds 2 mR/hr, the flashing light goes off and the horn sounds.
25. A sealed source is always contained in a tube, adapter or storage container and never exposed to air.
26. A. Keep source locked in container.
B. Keep storage area locked.
C. Post area with proper radiation warning signs.
27. If radiography is being performed in Lineac Room, lock room and notify Radiation Safety Supervisor, Q.A. Engineer and/or Q.A. Manager.

If "open air" radiography is being performed, post guards and notify proper supervision.
28. 1. Film Badges.
2. Pocket Dosimeters.
3. Gamma Alarms.
4. Shielding.
5. Survey Meters.
29. Geiger type survey meters are designed to read in R/hrs. Victoreen Survey Meters will show radiation intensity in mR/hrs, therefore, are more sensitive.
30. No. Only qualified personnel, familiar with radiation safety regulations are authorized to be in high radiation areas.
31. Survey meters are very delicate instruments. Every precaution should be taken not to bump, shake, jar or abuse the instruments in any way. To ensure accuracy, each survey meter is recalibrated every three (3) months or sooner when there is reason to question the accuracy of readings.
32. Half Value Layer .61 for iron with Iridium-192.
.87 for copper with Radium-226.
33. $1 \text{ Ci @ } 1' = 14.5 \text{ R/hr}$ thus $l_1 : l_2 = D_2^2 : D_1^2$
 $10 \text{ Ci @ } 1' = 145 \text{ R/hr}$ $145 : l_2 = 100 : 1$
 $l_2 = \frac{145}{100} = 1.45 \text{ R/hr}$

(Procedure 2)

SECTION 8

ANSWERS TO TEST FOR RADIOGRAPHERS (Cont'd.)

34. 20 Ci of Cobalt-60 @ 1' = 290 R/hr (14.5 x 20)

$$290 \times 1000 = 290,000 \text{ mR/hr}$$

$$I_1 = 290,000 ; I_2 = 50 ; D_1^2 = 1^2$$

$$50 : 290,000 = 1 : D_2^2$$

$$50 D_2^2 = 290,000 \quad \left(\frac{290,000}{50} = D_2^2 \right) \quad \sqrt{\frac{76}{5800}}$$

$$D_2^2 = 5800$$

$$D_2 = 76$$

35. $I_1 = 30,000 \text{ mR/hr}$ $\frac{30,000}{15} = 2000 \text{ reduction factor.}$

$$I_2 = 15 \text{ mR/hr} \quad 2000 \text{ w/Cobalt-60} = 5.4'' \text{ Pb.}$$

36. 1 Ci of Cobalt-60 @ 1' = 14.5 R/hr.

$$1 \text{ Ci of Cobalt-60 @ 5' = .57 R/hr} = 570 \text{ mR/hr.}$$

Concrete to reduce 570 mR/hr to 5.32 mR/hr = 107.5 reduction factor.

107.5 reduction factor = 19" concrete.

(Procedure 2)

SECTION 8

ANSWERS TO TEST FOR RADIOGRAPHERS (Cont'd.)

34. 20 Ci of Cobalt-60 @ 1' = 290 R/hr (14.5 x 20)

$$290 \times 1000 = 290,000 \text{ mR/hr}$$

$$I_1 = 290,000 ; I_2 = 50 ; I_1^2 = I_2^2$$

$$50 : 290,000 = 1 : D_2^2$$

$$50 D_2^2 = 290,000 \quad \left(\frac{290,000}{50} = D_2^2 \right) \quad \sqrt{\begin{array}{r} 76 \\ 5800 \\ 49 \\ 900 \\ 876 \end{array}}$$

$$D_2^2 = 5800$$

$$D_2 = 76$$

35. $I_1 = 30,000 \text{ mR/hr}$ $\frac{30,000}{15} = 2000 \text{ reduction factor.}$

$I_2 = 15 \text{ mR/hr}$ 2000 w/Cobalt-60 = 5.4" Pb.

36. 1 Ci of Cobalt-60 @ 1' = 14.5 R/hr.

1 Ci of Cobalt-60 @ 5' = .57 R/hr = 570 mR/hr.

Concrete to reduce 570 mR/hr to 5.32 mR/hr = 107.5 reduction factor.

107.5 reduction factor = 19" concrete.

Struthers

SECTION 8

RECORDS (RADIOGRAPHERS)

A complete documented history on each individual is maintained showing training, results of tests, etc.

Struthers

SECTION 8A

TRAINING PROGRAM FOR RADIOGRAPHER'S ASSISTANT

The detailed Struthers Wells Training Program for Radiographer's Assistant outlines the following major areas of coverage:

- A. Training Program Outline (Radiographer's Assistant)
- B. On-The-Job Training (Radiographer's Assistant)
- C. Training of Experienced Radiographer's Assistant
- D. Periodic (Refresher) Training (Radiographer's Assistant)
- E. Testing Procedures (Radiographer's Assistant)
- F. Records (Radiographer's Assistant)

Struthers

SECTION 8A

TRAINING PROGRAM OUTLINE (RADIOGRAPHER'S ASSISTANT)

The following Training Program Outline is intended to provide instruction as outlined in Section 34.31(b) of 10 CFR Part 34. It provides a detailed outline of each item and the amount of time spent on each item.

Struthers Wells Corporation will not permit any individual to act as a Radiographer's Assistant until such individual:

- a. Has received copies of and instruction in Struthers Wells Operating and Emergency Procedures;
- b. Has demonstrated competence to use, under the personal supervision of the Radiographer, the radiographic exposure devices, sealed sources, related handling tools and radiation survey instruments that the Assistant will use; and
- c. Has demonstrated understanding of the above instructions by successfully completing a written or oral test and a field examination on the subjects covered.

Struthers

SECTION 8A

A. TRAINING PROGRAM OUTLINE (RADIOGRAPHER'S ASSISTANT)

I. FUNDAMENTALS OF RADIATION SAFETY (15 HOURS INSTRUCTION)

- A. Characteristics of gamma radiation
- B. Units of radiation dose (mR) and quantity of radioactivity (Curie)
- C. Hazards of exposure to radiation
- D. Levels of radiation from licensed material
- E. Method of controlling radiation dose
 - 1. Working time
 - 2. Working distance
 - 3. Shielding

II. RADIATION DETECTION INSTRUMENTATION TO BE USED (10 HOURS INSTRUCTION)

- A. Use of radiation survey instruments
 - 1. Operation
 - 2. Calibration
 - 3. Limitations
- B. Survey instruments
- C. Use of personnel monitoring equipment
 - 1. Film badges
 - 2. Pocket dosimeters

III. RADIOGRAPHIC EQUIPMENT TO BE USED (10 HOURS INSTRUCTION)

- A. Remote handling equipment
- B. Radiographic exposure devices
- C. Storage containers

IV. INSPECTION AND MAINTENANCE PERFORMED BY RADIOGRAPHERS (5 HOURS INSTRUCTION)

V. CASE HISTORIES OF RADIOGRAPHY ACCIDENTS (5 HOURS INSTRUCTION)

Struthers

SECTION 8A

ON-THE-JOB TRAINING (RADIOGRAPHER'S ASSISTANT)

The training period consists of a minimum of forty-five (45) hours of initial classroom training in Struthers Wells Operating and Emergency Procedures as specified in the Training Program Outline. Radiographer's Assistant shall demonstrate competence to use the radiographic equipment to the Radiation Safety Officer (limited to demonstration only). Until such time as the above requirements are completed, no individual will be qualified as a Radiographer's Assistant.

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SECTION 8A

TRAINING OF EXPERIENCED RADIOGRAPHER'S ASSISTANT


Experienced personnel shall be required to complete a minimum of twenty (20) hours of classroom training related to Struthers Wells specific work program and equipment and a minimum of two (2) weeks performing radiographic operations under the direct supervision of a fully qualified Radiographer.

The competency of the above individual to use radiographic equipment and his understanding of Struthers Wells Operating and Emergency Procedures is determined by the same test examination given to qualify individuals as a Radiographer's Assistant.

Struthers

SECTION 8A

PERIODIC (REFRESHER) TRAINING (RADIOGRAPHER'S ASSISTANT)

Each Radiographer's Assistant is given annual sessions to review new regulations, procedures, policies and equipment. Equipment functioning and maintenance is also reviewed. 

Case histories of radiographic accidents distributed by the NRC are also reviewed during the above sessions.

Internal Audit--Each Radiographer's Assistant shall be audited by the Radiation Safety Officer once every three (3) months to ensure they are performing radiographic operations in accordance with NRC regulations, license conditions and Struthers Wells Operating and Emergency Procedures.

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SECTION 8A

TESTING PROCEDURES (RADIOGRAPHER'S ASSISTANT)

Individuals qualifying as Radiographer's Assistant must demonstrate their understanding of the instructions contained in the formal classroom training by successful completion of a written and a field examination on the Operating and Emergency Procedures and the use of the radiographic equipment. A grade of 80% is required for passing. Any items missed on the examination shall be immediately reviewed with the individual before he is qualified.

The written examination consists of a minimum of thirty (30) questions on the Operating and Emergency Procedures and the use of radiographic equipment. The field demonstration to determine the competency of the individual to use radiographic equipment shall be witnessed by the Radiation Safety Officer and includes survey of the camera, facility, assembly and disassembly of the equipment and proper storage of the equipment.

SECTION 8A

TEST FOR RADIOGRAPHER'S ASSISTANT

Name _____ Date _____ Grade _____

1. Cobalt⁶⁰ used in nondestructive examinations emit:
 - a. alpha particles.
 - b. neutrons.
 - c. gamma rays.
 - d. x-rays.
2. Lead is frequently employed in shielding against radiation from x-ray and gamma ray sources because of its:
 - a. extremely low cost.
 - b. high absorption for a given thickness and weight.
 - c. ability to emit electrons when irradiated.
 - d. ability to diffract alpha particles.
3. The time required for one half of the atoms in a particular sample of radioactive material to disintegrate is called:
 - a. the inverse square law.
 - b. a curie.
 - c. a half life.
 - d. the exposure time.
4. What does the term R/hr refer to when speaking of intensity?
 - a. Radiation limits for humans.
 - b. Roentgens per hour.
 - c. X-Rays per hour.
 - d. Radiation in hydrogen.
5. Upon completing an x-ray exposure and turning the equipment off:
 - a. personnel should wait for a few minutes before entering the exposure area.
 - b. personnel should wear a lead-lined apron before entering the exposure area.
 - c. personnel may enter the exposure area without fear of radiation exposure.
 - d. personnel should take a reading with a Geiger counter before entering the exposure area.
6. The most widely used unit of measurement for measuring the rate at which the output of a gamma ray source decreases is the:
 - a. curie.
 - b. Roentgen.
 - c. half life.
 - d. MEV.

SECTION 8A

TEST FOR RADIOGRAPHER'S ASSISTANT (Cont'd.)

7. Small amounts of exposure to x-rays or gamma rays:
- will have a cumulative effect which must be considered when monitoring for maximum permissible dose.
 - will be beneficial since they build up an immunity to radiation poisoning.
 - will have no effect on human beings.
 - will have only a short-term effect on human tissues.
8. A dose of _____ would be dangerous, if not fatal, if applied to the entire body in a short period of time.
- 1.5 to 15 R.
 - 25 to 70 R.
 - 200 to 800 R.
 - All of the above doses would most likely be fatal.
9. When doing gamma ray radiography with high-intensity emitters, the sources are best handled:
- directly by personnel equipped with special protective clothing.
 - by remote handling equipment which permits the operator to remain several yards away at all times.
 - directly by personnel with special protective clothing except when radiographs are being made.
 - by the same methods used for low-intensity emitters.
10. A Cobalt⁶⁰ capsule will have a half-life of:
- 1.2 years.
 - 6 months.
 - 5.3 years.
 - 75 days.
11. Over exposure to x-rays or gamma rays may cause damage to human:
- blood tissue.
 - skin.
 - internal organs.
 - all of the above.
12. What is the weekly permissible radiation dose allowed? Daily dose?
13. How is energy of a gamma source measured?
14. What harm can an excessive dose of radiation do to the human body?

SECTION 8A

TEST FOR RADIOGRAPHER'S ASSISTANT (Cont'd.)

15. What is the level of radiation of Cobalt⁶⁰ from a 1 Curie source at 1 ft.?
16. What is the level of radiation of Iridium¹⁹² from a 1 Curie source at 1 ft.?
17. How does working time affect radiation dose if all other factors are equal?
18. How does working distance affect radiation dose if all other factors are equal?
19. What are some of the good shielding materials used in controlling radiation dose?
20. What is the purpose of our Victoreen survey meter?
21. When starting a day's work, what is the first thing the operator must do?
22. At what survey meter reading must an area be roped off?
23. Why do we wear film badges?
24. Why do we wear pocket dosimeters?
25. Give a brief description of how the gamma radiographic equipment is used.
26. For what purpose are we using the radioactive isotope?
27. Will our radioactive isotope cause radioactivity on objects we plan to gamma ray?

SECTION 8A

TEST FOR RADIOGRAPHER'S ASSISTANT (Cont'd.)

28. In case of an emergency, whom do you notify?
29. Where is the proper storage area for our radioactive isotopes?
30. How will we prevent tampering or removal of by-product material by unauthorized personnel?
31. Assume that the isotope has become stuck with the source out somewhere in the tube. What should you do?
32. List necessary safety equipment for radiography.

SECTION 8A

ANSWERS TO TEST FOR RADIOGRAPHER'S ASSISTANT

1. c
2. b
3. c
4. c
5. c and d
6. c
7. a
8. c
9. b
10. c
11. d
12. Weekly average - 100 mR/hr $\frac{5000 \text{ mR/hr per year}}{50 \text{ weeks}} = 100 \text{ mR/hr}$
Daily average - 20 mR/hr $\frac{100 \text{ mR/hr per week}}{5 \text{ days}} = 20 \text{ mR/hr}$
13. Survey meter which measures R/hr and mR/hr.
14. Effects blood forming organs.
15. 13.31 to 14.5 R/hr at 1 foot.
16. 5.9 R/hr at 1 foot.
17. The shorter the time spent in radiation area, the less radiation absorbed.
18. The greater the distance from a gamma emitter, the less exposure to radiation.
See Inverse Square Law.
19. Lead screens, concrete walls, etc.
20. To measure quantity of radiation in mR/hr.
21. A. Wear film badge.
B. Wear a calibrated pocket dosimeter.
C. Survey (with meter) whether source is in storage container.

SECTION 8A

ANSWERS TO TEST FOR RADIOGRAPHER'S ASSISTANT (Cont'd.)

22. 2 mR/hr.
23. To record weekly accumulation of exposure to radiation.
24. To immediately monitor amount of exposure to radiation.
25. In storage, isotope is locked in an apparatus which is shielded with lead. To use source for industrial radiography, the following steps must be taken:
 - A. At all times, ensure that isotope is inside the apparatus when entering storage area by checking with survey meter.
 - B. Position source tube (flexible hose) for intended radiograph.
 - C. Position control assembly so that hand crank is behind shielding.
 - D. Unlock apparatus with key.
 - E. Retreat behind shielding and crank the isotope out of the camera into the source tube. Exercise care not to ram isotope against end of source tube. Observe numbers on counter attached to crank assembly before pushing isotope into source tube and after retracting.
26. Radioactive isotopes are ideal for industrial radiography of thick metal specimens.
27. No. Since radioactive isotopes give off gamma waves, radiation is not present after source is withdrawn.
28. Your immediate supervisor, Quality Assurance Engineer or Quality Assurance Manager.
29. In designated area, under lock and key.
30.
 - A. Keep source locked in container.
 - B. Keep storage area locked.
 - C. Post area with proper radiation warning signs.
31. If radiography is being performed in Cobalt Room, lock room and notify immediate supervisor, Quality Assurance Engineer and/or Quality Assurance Manager.

If "open air" radiography is being performed, post guards and notify proper supervision.
32.
 1. Film badges.
 2. Pocket dosimeters.
 3. Gamma alarms.
 4. Shielding.
 5. Survey meters.

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SECTION 8A

RECORDS (RADIOGRAPHER'S ASSISTANT)

A complete documented history on each individual is maintained showing training, results of tests, etc.

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SECTION 9

PERMANENT SHIELDED RADIOGRAPHY FACILITY

The Linear Accelerator Room consists of concrete walls 36" - 42" which are continually monitored with film badges to ensure a radiation level of not more than 2 mR/hr. at a distance of 18" from the external surface. The roof is a metal corrugated structure 20' high with a large rotating warning light that is actuated by radiation. Access to the roof is restricted; there is no ladder to get to the roof and also, there are large signs painted on the outside of the facility restricting access to the roof without specific approval. Access to the facility is controlled by a double set of locked doors and an alarm and flashing light system which remains on when radiation is present. In addition, a loud audible alarm sounds when the movable door opens or closes. The isotopes, Cobalt⁶⁰ (100 Curies) and Iridium¹⁹² (100 Curies), are used in the center of the facility.

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SECTION 10

RADIATION SAFETY PROGRAM

Section 10.1 Personnel Monitoring Equipment

Section 10.2 Radiation Detection Instruments

Section 10.3 Internal Inspection Program

Section 10.4 Operating and Emergency Procedures

10.4.1 Handling and Use of Sealed Sources and Radiographic
Exposure Devices

10.4.2 Methods and Occasions for Conducting Radiation Surveys

10.4.3 Methods for Controlling Access to Radiographic Areas and
Radiation Exposure Outside Radiographic Areas

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

10.4.5 Personnel Monitoring and the Use of Personnel Monitoring
Equipment

10.4.6 Transporting Sealed Sources, Securing Exposure Devices
and Storage Containers in Vehicles, Posting of Vehicles,
and Control of Sealed Sources During Transportation

10.4.7 Minimizing Exposure of Persons in the Event of an Accident

10.4.8 Notification of Proper Persons in the Event of an Accident

10.4.9 Maintenance of Records

10.4.10 Daily Inspection and Quarterly Maintenance of Exposure
Devices and Storage Containers.

10.4.11 Off-Scale Pocket Dosimeter Readings

10.4.12 Procedure for Identifying and Reporting Defects and Non-
compliance as Required by 10 CFR Part 21

Section 10.5 Leak Testing Procedure

Struthers

SECTION 10.1

PERSONNEL MONITORING EQUIPMENT

A. Pocket Dosimeters

1. A direct-reading pocket dosimeter, Model No. 541A, 541F or 541R, with range 0-200 mR from Victoreen Instrument Company, Cleveland, Ohio, shall be worn on the chest by the operator whenever the sealed source is used.
2. The dosimeter should be calibrated daily with charging unit, Model No. 2000A. Records will be kept by the Radiation Safety Officer. ³
3. The manufacturer's instructions for charging and reading of the dosimeters shall be followed.
4. Dosimeters shall be issued to each individual Radiographer.

B. Film Badges

1. Film badges will be issued in accordance with the policy and procedures for employees engaged in and exposed to ionizing radiations by the Radiation Safety Officer. Film badges shall be worn on the chest by the operator whenever the sealed source is used.
2. Permanent records of the exposure of each individual assigned a badge will be maintained by the Radiation Safety Officer.
3. Film badges are supplied and analyzed by R. S. Landauer, Jr. and Company, Glenwood, Illinois, on a weekly basis for each individual involved in radiography. When a high reading of radiation is suspected, film badge is sent to R. S. Landauer, immediately, for analysis.

C. Alarming Ratemeter (Dosimeter) ³

1. An alarming ratemeter, Model 18C, from Dosimeter Corporation, with range of 500 mR, shall be worn on the chest by the operator whenever the sealed source is used. Calibration of instrument shall be performed annually by Applied Health Physics, Inc., Bethel Park, PA.

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SECTION 10.2

RADIATION DETECTION INSTRUMENTS

- A. A Survey Meter, Model #592B or #492, from Victoreen Instrument Co., Cleveland, Ohio, shall be used at each radiography site. The instrument is capable of measuring gamma-rays from less than one (1) mR/hr to one (1) R/hr. For operation of the instrument, the manufacturer's instructions shall be followed. Seven (7) Survey Meters are in our possession.
- B. A Gamma Alarm, Model No. 808B or 808D, from Victoreen Instrument Company, Cleveland, Ohio, shall be situated on the wall in the personnel entrance of the Cobalt Room and Lineac Room exposed to radiation. This instrument is capable of measuring from less than 0.1 mR/hr to 100 mR/hr and the audio sound is triggered at 2 mR/hr. For operation of the instrument, the manufacturer's instructions shall be followed. Four (4) Gamma Alarms are in our possession.
- C. The radiation detection instruments will:
 - 1. be calibrated so that the readings are $\pm 20\%$ of the actual values of the range of the instrument;
 - 2. have a chart showing the results of calibration, the date of the last calibration, and the due date of the next calibration affixed to the instrument;
 - 3. be calibrated at least every three (3) months or after each servicing; and
 - 4. be calibrated and repaired by Applied Health Physics, Inc., Bethel Park, Pennsylvania.
- D. Records of calibration will be kept for a minimum of two (2) years after each calibration by the Radiation Safety Officer.

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SECTION 10.3

INTERNAL INSPECTION PROGRAM

1. Receipt of radioactive material shall be controlled as outlined on Form X74.
2. Possession and use of radioactive material shall be controlled as outlined in the Operating and Emergency Procedures.
3. Internal inspection shall be conducted by the Radiation Safety Officer for each Radiographer and Radiographer's Assistant at intervals not to exceed three (3) months. If a Radiographer or Radiographer's Assistant does not perform radiography for a period that exceeds three (3) months, the inspection shall be carried out the first time that person engages in radiographic operations. Internal inspections shall be carried out in accordance with Quarterly Performance Checklist (Radiographers), Form X79.
4. The Nondestructive Examination Supervisor or Radiation Safety Officer shall make a continuing review of quarterly inventories, utilization logs, records of receipt and disposal of licensed material, personnel monitoring results and surveys.
5. Deficiencies discovered during the internal inspections by the Nondestructive Examination Supervisor shall immediately be recorded and reported to the Radiation Safety Officer. If the deficiency is not minor, it shall be reported to the President; otherwise, the Radiation Safety Officer will take immediate corrective action as required. Corrective action will consist of personnel training and procedure changes, where applicable, to ensure against additional deficiencies.

QUARTERLY PERFORMANCE CHECKLIST (RADIOGRAPHERS)

Radiographic Location _____ Date _____
 Radiographer _____ Inspector _____
 Radioisotope _____ Curies _____
 Projector Serial No. _____
 Survey Meter Serial No. _____ Calibration Due Date _____

- | | <u>Yes</u> | <u>No</u> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------|
| 1. Was the Radiographer wearing a film badge and a charged and zeroed 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 radiation area controlled by a calibrated and properly operating, mounted Gamma Alarm? | _____ | _____ |
| 6. Was the high radiation area posted with "CAUTION (or DANGER) HIGH RADIATION AREA" signs? | _____ | _____ |
| 7. Did the Radiographer have a calibrated and properly operating Survey Meter? | _____ | _____ |
| 8. Were the utilization log and other required daily logs properly filled out? | _____ | _____ |
| 9. Did the Radiographer have sufficient knowledge of safety rules? (Oral questions.) | _____ | _____ |
| 10. Was the Radiographer working with defective equipment? | _____ | _____ |
| 11. Did the Radiographer properly survey the source projector and source tube and take a radiation reading one foot (1') (0.3m) in front of the source following the radiographic exposure? | _____ | _____ |
| 12. Were radioactive isotopes stored properly and kept locked to prevent unauthorized removal? | _____ | _____ |
| 13. Was the storage area posted with "CAUTION (or DANGER) RADIOACTIVE MATERIAL" signs? | _____ | _____ |
| 14. 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? | _____ | _____ |
| 15. Were there any items of noncompliance other than those listed on this form? (If any, explain in remarks below.) | _____ | _____ |

REMARKS: _____

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SECTION 10.4

OPERATING AND EMERGENCY PROCEDURES

REFERENCE: Paragraph 34.11(c) of 10 CFR Part 34 and Section 34.32 of 10 CFR Part 34.

- 10.4.1 Handling and Use of Sealed Sources and Radiographic Exposure Devices
- 10.4.2 Methods and Occasions for Conducting Radiation Surveys
- 10.4.3 Method for Controlling Access to Radiographic Areas and Radiation Exposure Outside Radiographic Areas
- 10.4.4 Methods and Occasions for Locking and Securing Radiographic Exposure Devices, Storage Containers and Sealed Sources
- 10.4.5 Personnel Monitoring and the Use of Personnel Monitoring Equipment
- 10.4.6 Transporting Sealed Sources, Securing Exposure Devices and Storage Containers in Vehicles, Posting of Vehicles, and Control of Sealed Sources During Transportation
- 10.4.7 Minimizing Exposure of Persons in the Event of an Accident
- 10.4.8 Notification of Proper Persons in the Event of an Accident
- 10.4.9 Maintenance of Records
- 10.4.10 Daily Inspection and Quarterly Maintenance of Exposure Devices and Storage Containers
- 10.4.11 Off-Scale Pocket Dosimeter Readings
- 10.4.12 Procedure for Identifying and Reporting Defects and Noncompliance as Required by 10 CFR Part 21

Struthers

10.4.1 HANDLING AND USE OF SEALED SOURCES AND RADIOGRAPHIC EXPOSURE DEVICES

A. The following step-by-step instructions shall be followed in operating the Automation Industries cameras in setting up radiographic operations:

- (1) The Radiographic Operator shall acquire at least one (1) suitable survey instrument, such as Victoreen Model No. 592B. The instrument must be calibrated and in good working order. The Radiographic Operator shall then check the camera for safe 2 mR/hr reading.
- (2) The Radiographic Operator shall then properly connect the source tube and control assembly to the camera.
- (3) The Radiographic Operator shall then lock the camera. The camera is then ready for use.
- (4) The Radiographic Operator shall move outside the Lineac Room and turn the control handle clockwise moving the source to the end of the source tube for the desired exposure time. The control assembly indicates the position of the source at all times to the nearest inch.
- (5) The Radiographic Operator shall retract the source into the camera, turning the control handle in the opposite direction after the desired exposure time.
- (6) The Radiographic Operator shall then take his survey meter, Victoreen Model No. 592B, and enter the Lineac Room.
- (7) The Radiographic Operator shall then check with his survey meter on all four (4) sides of the camera and the entire length of the guide tube to ensure the source has been properly positioned, and then he will lock the camera. This will be confirmed by a reading of less than 10 mR at the camera.

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10.4.1 (Continued)

Gamma Radiography shall be performed in the Lineac Room, where possible. If, under certain conditions, equipment to be radiographed cannot be moved, lead screens 90" x 90" x 1/4" thick are to be used to reduce radiation. The control shall be operated at the maximum possible distance from the source and the Radiographic Operator shall remain at the control only to operate the source and then retire speedily to a safe distance first determined by calculation and then checked with a survey meter. Rope barriers and "Caution-High Radiation Area" signs shall be placed at the estimated 100 mR/hr boundary and the "Caution-Radioactive Material" and "Caution-Radiation Area" signs shall be placed at the estimated 2 mR/hr boundary. Guards shall be posted continually during exposure time to prevent violation of the barrier. Complete records of the radiography including the names and exposures of the personnel shall be kept.

- B. The following step-by-step Automation Industries operating instructions shall be followed in the Lineac Room for Source Changer 500SU or 43868 by Radiographic Supervisor when changing short-lived Iridium isotopes:
- (1) The Radiographic Operator will have an operating survey meter, Victoreen Model No. 592B, on hand.
 - (2) Locate the source changer within two (2) feet of the shielded head.
 - (3) Remove the plug or source tube from the machine outlet.
 - (4) Remove ROUND PLUG from source changer. Save (new) source number plate.
 - (5) Connect the short source tube supplied to machine outlet and source changer outlet.

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10.4.1 (Continued)

- (6) Connect source position indicator control to machine lock box and extend control so that operator is positioned full twenty-five (25) feet from machine.
- (7) Run decayed source into source changer by turning control handle clockwise until source stops in the changer.
- (8) At this point, the survey meter should be employed to ensure that source has been safely located in shielded position by monitoring the source tube and container. This will be confirmed by a reading of less than 10 mR at the camera.
- (9) Disconnect short source tube at source changer and disengage disconnects, being careful not to pull out source.
- (10) Replace ROUND PLUG, securing decayed source in changer.
- (11) Remove HEX HEAD PLUG from source changer, being careful not to pull out source cable inside.
- (12) Carefully pull the source cable disconnect only enough to allow joining of disconnects.
- (13) Join disconnects on control cable and source cable.
- (14) Connect short source tube to source changer outlet.
- (15) Pull source into machine by turning control handle counter-clockwise.
- (16) After a monitor check around all four (4) sides of the container and the entire guide tube has been made with a survey meter, remove short source tube. Proper safety source location will be confirmed by a reading of less than 10 mR at the camera.

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10.4.1 (Continued)

- (17) Replace HEX HEAD PLUG on empty source changer hole.
- (18) Remove decayed source number plate from plate holder on machine and replace with new source number plate attached to lead seal wire. Attach old source number plate to source changer cap plug by lacing seal wire provided through number plate when sealing returned source.

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10.4.2 METHODS AND OCCASIONS FOR CONDUCTING RADIATION SURVEYS

A. The following radiation surveys are examples of surveys required during radiography and associated operations:

- (1) A physical radiation survey of all four (4) sides of the container and the entire length of the guide tube shall be made by the Radiographic Operator after each radiographic exposure during a radiographic operation to determine that the sealed source has been returned to its shielded condition. This will be confirmed by a reading less than 10 mR at camera.
- (2) A physical radiation survey of all four (4) sides of the container and the entire length of the guide tube shall be made by the Radiographic Operator to determine that each sealed source is in its shielded condition prior to securing the radiographic device and storage container. This will be confirmed by a reading of less than 10 mR at camera. Records shall be kept of these surveys on Form X61 for inspection by the Commission.
- (3) Daily radiographic surveys shall be conducted at each site where radiographic exposures are made and shall be recorded on Form X72 for record purposes. Surveys shall ensure that outer limits at site are less than 2 mR/hr.
- (4) If the exposure device is moved from the exposure site to another location for storage, a survey prior to securing the device shall be made in addition to the survey made upon completion of the last exposure.

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10.4.2 (Continued)

- (5) Surveys that ensure containers prepared for shipment comply with Department of Transportation regulations.

These surveys and others required are discussed in more detail under the appropriate sections. In general, surveys shall be made whenever a source is manipulated or moved.

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10.4.3 METHODS FOR CONTROLLING ACCESS TO RADIOGRAPHIC AREAS AND RADIATION
EXPOSURE OUTSIDE RADIOGRAPHIC AREAS

- A. The Radiation Safety Officer must authorize the use of the source after evaluation of need, location of use, exposure times and levels to all personnel and manipulation techniques.
- B. Prior to obtaining the source from the storage area:
- (1) All equipment required to assure safe operation shall be secured. This equipment shall include:
 - Radiation Signs
 - Alarming Ratemeters
 - Survey Instruments
 - Pocket Dosimeters
 - (2) The distance from the source at which the dose rate levels do not exceed 2 mR/hr must be determined and this radiation area established with magenta and yellow tape and "Caution-Radioactive Material" and "Caution-Radiation Area" signs. The "Caution-High Radiation Area" signs shall be placed at the estimated 100 mR/hr boundary.
 - (3) The survey instrument must be checked for response with the source still in the shield.
- C. When using the source in the radiation area:
- (1) The operator must not leave the radiation area unattended.
 - (2) A survey must be made of the perimeter of the radiation area after the source is in place and tapes and signs adjusted accordingly to confirm the 2 mR/hr level.

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Struthers

10.4.3 (Continued)

- (3) Access to the radiation area is limited to x-ray personnel wearing film badge and dosimeter and approved by the Radiation Safety Officer.
 - (4) Upon completion of each exposure, a survey of all four (4) sides of the camera and the entire length of the guide tube must be made to assure that the source has been returned to the shield.
- D. Upon completion of the work in the radiation area:
- (1) The source in the shield must be locked and returned to the storage area.
 - (2) A survey made of the storage area to assure that the radiation levels are compatible with storage limits of 2 mR/hr.
 - (3) The exposure of the operator as measured by the dosimeter must be logged.
- E. The Radiographic Operator shall maintain direct surveillance of the radiographic operation to ensure unauthorized personnel do not enter the high radiation area. The majority of radiographic operations are done in the Lineac Room where access to the room is restricted by a locked door at all times.

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10.4.4 METHODS AND OCCASIONS FOR LOCKING AND SECURING RADIOGRAPHIC EXPOSURE
DEVICES, STORAGE CONTAINERS AND SEALED SOURCES

A. In order to assure that radioactive sources do not become radiation hazards during periods of storage and transfer, the following rules shall be followed:

(1) Sources shall be stored in the Lineac Room. This room must be locked when source containers are in storage. Source containers shall be locked.

(2) Each source container shall bear a durable, clearly visible label bearing a standard radiation warning symbol and the following information:

Caution-Radioactive Material

Kind of Material

Amount of Material

(3) Transfer of the source from the storage area to the radiation area of operation must be made with the source in the camera. Precautions shall be taken to assure that, in transportation, the source cannot be released from the camera even in the event of collision or spills.

(4) A survey instrument shall be available with the transfer vehicle.

(5) As stated earlier in this procedure, the devices must be secured in the shielded position each time the source is returned to that position and the device must be locked at the end of each exposure. A radiation survey, including the guide tube and device itself, shall be performed to confirm that the source is in the safe shielded position.

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10.4.5 PERSONNEL MONITORING AND THE USE OF PERSONNEL MONITORING EQUIPMENT

- A. All radiographic personnel shall wear a film badge on the chest and a pocket dosimeter at all times during radiographic operations.
- B. Pocket dosimeter shall be capable of measuring doses from zero to at least 200 mR and shall be calibrated daily before use.
- C. Pocket dosimeters shall be checked twice daily and shall be recorded at the beginning and end of each workday.
- D. A film badge shall be worn by one person only and shall be the specific badge assigned to that individual.
- E. The film badge shall be immediately processed if the pocket dosimeter is discharged beyond its 200 mR/hr range. The Radiographic Operator will notify the Radiation Safety Officer immediately. The Radiation Safety Officer in turn will:
 - (1) Terminate Radiographer's participation in duties which require exposure to radiation.
 - (2) Arrange to have Radiographer's film badge processed immediately.
 - (3) Determine from accumulative dose records whether additional exposure to radiation exceeds maximum permissible limits.
- F. Film badges are supplied and analyzed by R. S. Landauer, Jr. & Company, Glenwood, Illinois, on a weekly basis for each individual involved in radiography. When a high reading is suspected, film badge is sent to R. S. Landauer immediately for analysis.
- G. The dosimetry devices are maintained in the Radiographic Analyst's office to avoid against adverse environmental conditions.
- H. The Radiographic Operator shall complete the required Radioactive Isotope Checklist, Form X60, before starting work.

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10.4.6 TRANSPORTING SEALED SOURCES, SECURING EXPOSURE DEVICES AND STORAGE CONTAINERS IN VEHICLES, POSTING OF VEHICLES, AND CONTROL OF SEALED SOURCES DURING TRANSPORTATION

A. Struthers Wells Corporation (SWC) does not transport sealed sources for field use and would only be involved in transporting a sealed source when the sealed source is to be replaced by a new source. All the Automation Industries equipment are designed as shipping containers as well as radiographic equipment. However, in transporting such sources in containers by truck, the following safety precautions shall be strictly adhered to:

- (1) The equipment should be placed as far as possible from the driver or occupants. Pack the equipment to prevent movement and damage in transit. The equipment should be secured by locking so that the source cannot be in exposed position. After packing in the vehicle, both the equipment and the vehicle, including passenger compartment, shall be surveyed to ensure less than 2 mR/hr at both truck surface and passenger compartment. The vehicle shall be locked to protect against accidental or unauthorized removal of the source.
- (2) The vehicle shall be posted with placards as described in Department of Transportation regulations and specified by the Radiation Safety Officer.
- (3) The maximum permissible radiation level of the equipment (in closed position) shall be not more than 200 mR/hr on the surface or 10 mR/hr one meter from the device. Since the equipment has more than sufficient protection, normally no more than half this

Struthers

10.4.6 (Continued)

amount should be found. Radiation levels on the surface of the vehicle or passenger compartment cannot exceed 2 mR/hr.

- (4) The sources shall be securely locked within the vehicle during transportation and keys stay on person.
- (5) Both the sending and receiving terminals shall be notified of the expected arrival time. Immediate steps are to be taken to locate the vehicle if the expected arrival time has elapsed in case of accident to the vehicle or source. Immediate notification of one of the supervisors is required in case of accident. Every possible precaution should be taken in case of accident including roping off the possible hazardous area.

B. An accident is reportable if large-scale damage results or anytime cargo breaks loose because of impact. In case of an accident, loss, theft or radiation:

- (1) Call State Police-----Local
- (2) Call Struthers Wells-----814-726-1000 (Night or Day)
- (3) Call Nuclear Regulatory Commission,
Regional Compliance Office--215-337-5000 (Night or Day)

The following information must be given:

- (1) The source size, source material, maximum activity in Curies, housed in approved container (gamma camera or changer model number).
- (2) What the actual circumstances of the situation are. Exact location, nature of incident, people involved.

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10.4.6 (Continued)

- (3) State our plan for recovery of material.
- (4) State method adopted to keep the incident from recurring.
- (5) List names and addresses of people involved and/or who may have had exposure.

The driver shall follow these rules:

- (1) No riders.
- (2) Call Struthers Wells when:
 - (a) Stopping for gasoline or meals.
 - (b) Destination is reached.
 - (c) Starting return trip.
 - (d) Arriving at motel when overnight trip.
- (3) Shall know where the truck is at all times.
- (4) Never leave truck without checking to determine that doors are locked and that all radiation signs are in place.

NOTE: All calls shall include what activity driver is engaged in, location and timetable.

- (5) Shall wear his radiation badge at all times. A meter, monitoring radiation leakage, shall remain in the cab.

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10.4.7 MINIMIZING EXPOSURE OF PERSONS IN THE EVENT OF AN ACCIDENT

A. Personnel shall follow the below listed instructions in the event of any accident (i.e., source stuck in source tube, etc.):

- (1) If exposure is in the Lineac Room, the operator shall lock the door and immediately notify the Radiation Safety Officer who will notify Tech/Ops for assistance in retrieving the source.
- (2) If exposure is on shop floor, the Radiographic Operator will:
 - (a) Immediately proceed outside of the 2 mR/hr posted area.
 - (b) Post additional guards.
 - (c) Notify Radiation Safety Officer who will maintain direct surveillance and control over the area until the situation is corrected. Temporary shielding shall be set up to allow source to be safely moved to the Lineac Room and maintained until Tech/Ops can be contacted for assistance.

During removal operations, dosimeters shall be checked each half hour.

NOTE: Struthers Wells does not transport licensed material to field locations as a part of Struthers Wells operations.

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10.4.8 NOTIFICATION OF PROPER PERSONS IN THE EVENT OF AN ACCIDENT

A. In case of an accident involving a sealed source, e.g., if the gamma radiographic equipment fails to operate properly, immediately proceed to outside of the posted area, post additional guards about the area, and notify one (1) of the following:

(1)	<u>NAME</u>	<u>BUSINESS PHONE</u>	<u>HOME PHONE</u>
-----	-------------	-----------------------	-------------------

	Mr. F. J. McElroy 19 Kamp Street Warren, PA 16365	726-1000 Ext. 4.1	723-3170
--	---------------------------------------------------------	-------------------	----------



	Mr. C. H. Rowles Box 240, R.D. #2 Pittsfield, PA 16340	726-1000 Ext. 468	563-4225
--	--------------------------------------------------------------	-------------------	----------



- (2) The area shall be cleared of all personnel and a radiation area established to the 2 mR/hr dose rate level.
- (3) No access to the area will be allowed without approval of the Radiation Safety Officer.
- (4) Evaluation of conditions and actions to be taken to return conditions to normal shall be accomplished by the Radiation Safety Officer. In case of fire in the vicinity of a sealed source:
 - (a) Remove source camera to a safe area and establish a temporary radiation area.
 - (b) Notify fire chief of location of sources and provide monitoring services.

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10.4.9 MAINTENANCE OF RECORDS

- A. The Radiation Safety Officer is responsible for maintaining the below listed required records. These records shall be retained in the Radiation Safety Officer's file for review by the Commission.
- (1) Radiographic Log, Form N34, for each radiographic exposure.
 - (2) Checklist For Personnel Using Radioactive Isotopes, Form X60, for each Radiographic Operator taken daily.
 - (3) Radiation Surveys, Form X61, at one (1) foot from camera with each source in storage taken daily.
 - (4) Leak Test Record, Form X65, on each sealed source taken every six (6) months.
 - (5) Calibration Record, Form X66, on each radiation detection instrument taken every three (3) months.
 - (6) Quarterly Inventory Of Byproduct Materials, Form X67, on each sealed source.
 - (7) Radiation Exposure Report, Form X68, for each radiographic accident.
 - (8) Radiation Survey Report, Forms X72-A, X72-B and X72-C, on each radiation area.
 - (9) Daily Isotope Equipment Maintenance Inspection Checklist, Form X73, on each sealed source camera and equipment.
 - (10) Isotope Equipment Detailed Quarterly Maintenance Inspection Checklist, Form X73-A, on each sealed source camera and equipment.
 - (11) Procedure And Record Form For Receiving Packages Of Radioactive Material, Form X74, taken upon receipt of each new source.

Struthers

10.4.9 (Continued)

- (12) Calibration Of Dosimeters, Form X77, on each dosimeter taken every six (6) months.
- (13) Daily Log - Dosimeter Readings, Form X78, for each Radiographic Operator to record each time he works in an x-ray area.
- (14) Current Occupational External Radiation Exposure, Form NRC-5, for each individual involved in radiography taken weekly.
- (15) Annual Report For Radiation Exposure Monitoring (letter form) for each individual involved in radiography.

Struthers

10.4.10 DAILY INSPECTION AND QUARTERLY MAINTENANCE OF EXPOSURE DEVICES AND
STORAGE CONTAINERS

- A. The Radiographic Operator shall inspect daily before performing any radiographic exposures all equipment and record on Form X73. Any item that may be suspect shall be reported immediately to the Radiation Safety Officer and the equipment is to be taken out of service until approved by the Radiation Safety Officer.
- B. A detailed inspection and maintenance check of equipment shall be made by the Radiation Safety Officer, or his delegated representative, at least every three (3) months using Form X73-A.

Struthers

10.4.11 OFF-SCALE POCKET DOSIMETER READINGS

A. The film badge shall be immediately processed if the self-reading pocket dosimeter is found to be off-scale. There are no exceptions to this requirement. The Radiographic Operator will notify the Radiation Safety Officer immediately. The Radiation Safety Officer in turn will:

- (1) Have work stopped immediately and place source in the safe storage position in the exposure device.
- (2) Terminate Radiographer's participation in duties which require radiation.
- (3) Arrange to have Radiographer's film badge processed immediately.
- (4) Determine from accumulative dose records whether additional exposure to radiation exceeds maximum permissible limits.

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10.4.12 PROCEDURE FOR IDENTIFYING AND REPORTING DEFECTS AND NONCOMPLIANCE
AS REQUIRED BY 10 CFR PART 21

- A. Radiography personnel who discover any malfunctions or defects in radiographic equipment are required to notify the Radiation Safety Officer so that appropriate corrective action can be taken. The Radiation Safety Officer shall be the contact for the NRC when specific action is necessary per the requirements of 10 CFR Part 21.

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RADIOGRAPHIC LOG

²Curles At Time Of Exposure

- ☐ Linear Accelerator
☐ Cobalt⁶⁰
☐ Iridium¹⁹²

[illegible]



CHECKLIST FOR PERSONNEL USING RADIOACTIVE ISOTOPES

1. Are you wearing a film badge?
 2. Are you wearing a pocket dosimeter?
 3. Do you have a survey meter?
 4. Are instructions from NDE Supervisor specific and clear?
 5. Do you check to make sure that sealed source is in shielded position after each exposure?
 6. Are you keeping a log of each exposure?
 7. Do you check to see that source containers are locked during periods of inactivity?
- Storage Area -- Linear Room

Record the amount of radiation received by reading pocket dosimeter at the end of each shift.

[illegible]

In case of an emergency, immediately notify:

Mr. F. J. McElroy
Mr. C. H. Rowles

Home Phone: 723-3170
Home Phone: 563-4225

<input type="checkbox"/>	Iridium ¹⁹²	
<input type="checkbox"/>	Cobalt ⁶⁰	1546
		<u>151H</u>
<input type="checkbox"/>	Cobalt ⁶⁰	334
		680

[illegible]

* Starting Survey Reading--Reading when first approaching exposure device for use.

** Final Survey Reading--Reading of the last survey of the exposure device and guide tube prior to locking the device and ending direct surveillance of the operation.

*** Storage Survey Reading--Reading when exposure device is placed in storage.

NOTE: All above surveys shall be made around the entire circumference of the radiographic exposure device including source outlet port with the safety plug installed.

LEAK TEST RECORD

Per Approved Source Leak Procedure - Exhibit I

[illegible]

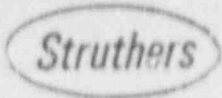
STRUTHERS WELLS CORPORATION

CALIBRATION RECORD

RADIATION DETECTION INSTRUMENTS

FREQUENCY - EVERY THREE (3) MONTHS

TYPE OF INSTRUMENT _____ MODEL NUMBER _____



STRUTHERS WELLS CORPORATION

QUARTERLY INVENTORY
OF
BYPRODUCT MATERIALS

Byproduct Material License and Amendment Number _____

The following Byproduct Materials are on hand at Struthers Wells Corporation (SWC) as of the dates indicated below:

[illegible]

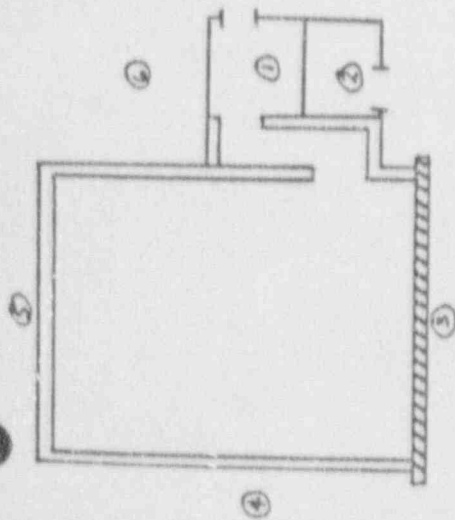
RADIATION EXPOSURE REPORT

- (a) Radiographer loses Film Badge in radiation area.
- (b) Pocket Dosimeter exceeds 100 mR/hr reading.
- (c) Any other incident which may result in questionable Film Badge readings.

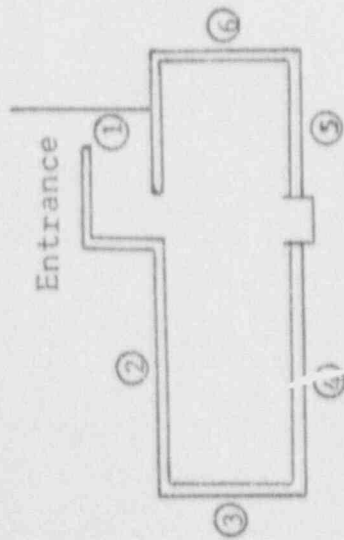
Date _____ Time _____ A.M. _____ P.M. _____

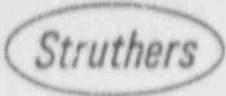
Form is to be filled out in duplicate. Original is to be forwarded to Quality Assurance Manager without delay. Copy is to be retained in X-Ray Department files.

(LINEAC ROOM)

[illegible]

RADIATION SURVEY REPORT

[illegible]



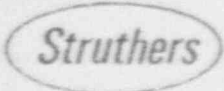
DAILY
ISOTOPE EQUIPMENT MAINTENANCE INSPECTION CHECKLIST

The following items are to be inspected to determine working condition and recorded below with (X) when satisfactory.

ITEMS:

1. Safety source lock.
2. Source drive cable and crank.
3. Source tube.
4. Capsule cable disconnect.
5. Radiation check at source lock (mR).

[illegible]

Struthers

STRUTHERS WELLS CORPORATION

ISOTOPE EQUIPMENT DETAILED QUARTERLY MAINTENANCE INSPECTION CHECKLIST

Storage Area: _____

The Isotope equipment listed is to be inspected to determine working condition and recorded on this form.

Cobalt-60

Source # _____

Model # _____

Size _____

Cobalt-60

Source # _____

Model # _____

Size _____

Iridium-192

Source # _____

Size _____

OPERATIONS TO BE PERFORMED

SATIS.

UNSATIS.

SATIS.

UNSATIS.

SATIS.

UNSATIS.

1. Check for changes in operating characteristics of the device.

2. Check proper operation of source position indicator mechanism.

3. Check proper operation of locking mechanism.

4. Check proper operation of crank.

5. Check source and drive cable for wear or damage.

6. Check for damaged or worn source and drive cable tube and connector wear and damage.

7. Check for rust, dirt or sludge buildup in the source tube.

8. Check proper positioning of source inside the shield.

9. Check shifting of shield inside projector housing.

10. Check proper connection of all mating components.

11. Check for damage to device which may impair operation.

12. Check for cable drive gear box damage and wear.

13. Check proper labeling on equipment.

14. Check Lineac Room doors and interlocks.

15. Check Lineac Room audible and visible warning devices.
(Per 10 CFR 34.29(c))

16. Check access door locking devices.

17. Check rooms for properly posted warning signs.

Comments:

Inspected By _____

Title _____

Date _____

STRUTHERS WELLS CORPORATION

PROCEDURE AND RECORD FORM FOR
RECEIVING PACKAGES OF RADIOACTIVE MATERIAL

1. Upon receipt of a package containing quantities of radioactive material, the Radiation Safety Officer (R.S.O.), or his delegated representative, shall monitor the radiation levels external to the package.
2. This package shall be monitored as soon as practicable after receipt, but no later than three (3) hours after the package is received during normal 8 to 5 p.m. working hours. If received after normal working hours, up to eighteen (18) hours is allowed. Package is to be immediately delivered to the Linear Room.
3. If radiation levels are found on the external surface of the package in excess of 200 millirems per hour, or at three (3) feet from the external surface of the package in excess of 10 millirems per hour, the Radiation Safety Officer shall be immediately informed, and he in turn will notify by telephone and telegraph, the final delivering carrier and the appropriate NRC Regional Office.

Radiation Record

Source and Quantity _____ Storage Area: _____

Source Number _____

Number Millirems on External Surface _____

Number Millirems at 3' From Surface _____

R.S.O. or Delegated Representative _____

(Signature) (Date)

RECORD FORM FOR SHIPPING PACKAGES
OF RADIOACTIVE MATERIAL

Source and Source Number _____

Number Millirems on External Surface _____

Number Millirems at 3' From Surface _____

R.S.O. or Delegated Representative _____

(Signature) (Date)

RADIATION DETECTION INSTRUMENTS
CALIBRATION OF DOSIMETERSForm X77

DAILY LOG

Month

If you worked in an x-ray area, record the Dosimeter Reading in the block.
If you did not work in an x-ray area, mark the block with a slash (/).

[illegible]

See instructions on Back

[illegible]

The preparation and safekeeping of this form or a clear and legible record containing all the information required on this form is required pursuant to Section 20.401 of "Standards for Protection Against Radiation," 10 CFR 20, as a current record of occupational external radiation exposures. Such a record must be maintained for each individual for whom personnel monitoring is required under Section 20.202. Note that a separate Form NRC-5 is to be used for recording external exposure to (1) the whole body; (2) skin of whole body; (3) hands and forearms; or (4) feet and ankles, as provided by Item 5 below.

Listed below by item are instructions and additional information directly pertinent to completing this form.

Identification

- Item 1. Self-explanatory.
- Item 2. Self-explanatory except that, if individual has no social security number, the word "none" shall be inserted.
- Item 3. Self-explanatory.
- Item 4. Self-explanatory.

Occupational Exposure

- Item 5. "Dose to the whole body" shall be deemed to include any dose to the whole body, gonads, active blood-forming organs, head and trunk, or lens of eye. Unless the lenses of the eyes are protected with eye shields, dose recorded as whole body dose should include the dose delivered through a tissue equivalent absorber having a thickness of 300 mg/cm² or less. When the lenses of the eyes are protected with eye shields having a tissue equivalent thickness of at least 700 mg/cm², dose recorded as whole body dose should include the dose delivered through a tissue equivalent absorber having a thickness of 1,000 mg/cm² or less.
Dose recorded as dose to the skin of the whole body, hands and forearms, or feet and ankles should include the dose delivered through a tissue equivalent absorber having a thickness of 7 mg/cm² or less. The dose to the skin of the whole body, hands and forearms, or feet and ankles should be recorded on separate forms unless the dose to those parts of the body has been included as dose to the whole body on a form maintained for recording whole body exposure.
- Item 6. This item need be completed only when the sheet is used to record whole body exposures and the licensee is exposing the individual under the provisions of Paragraph 20.101(b) which allows up to 3 rems per quarter to the whole body. Enter in this item the unused part of permissible accumulated dose taken from previous records of exposure, i.e., Item 18 of the preceding Form AEC-5 or NRC-5 or Item 13 of Form AEC-4 or NRC-4 if the individual's exposure during employment with the licensee begins with this record.
- Item 7. Indicate the method used for monitoring the individual's exposure to each type of radiation to which he is exposed in the course of his duties. Abbreviations may be used.
- Item 8. Doses received over a period of less than a calendar quarter need not be separately entered on the form provided that the licensee maintains a current record of the doses received by the individual which have not as yet been entered on the form. The period of exposure should specify the day the measurement of that exposure was initiated and the day on which it was terminated. For example, if only quarterly doses are entered, the period of exposure for the first calendar quarter of 1962 might be taken as running from Monday, January 1, 1962, through Friday, March 30, 1962, and would be indicated in this item as Jan. 1, 1962-Mar. 30, 1962. If weekly doses are entered, a film badge issued Monday morning, January 1, 1962, and picked up Friday, January 5, 1962, would be indicated as Jan. 1, 1962-Jan. 5, 1962.

- Items 9, 10 and 11. Self-explanatory. The values are to be given in rem. All measurements are to be interpreted in the best method known and in accordance with Paragraph 20.4(c). Where calculations are made to determine dose, a copy of such calculations is to be maintained in conjunction with this record. In any case where the dose for a calendar quarter is less than 10% of the value specified in Paragraph 20.101(a), the phrase "less than 10%" may be entered in lieu of a numerical value.
- Item 12. Add the values under Items 9, 10 and 11 for each period of exposure and record the total. In calculating the "Total" any entry "less than 10%" may be disregarded.
- Item 13. The running total is to be maintained on the basis of calendar quarters. Paragraph 20.3(a) (4) defines calendar quarter. No entry need be made in this item if only calendar quarter radiation doses are recorded in Items 9, 10, 11 and 12.

Lifetime Accumulated Dose (Whole Body)

NOTE: If the licensee chooses to keep the individual's exposure below that permitted in Paragraph 20.101(a), Items 14 through 18 need not be completed. However, in that case the total whole body dose for each calendar quarter recorded in Item 13 (or Item 12 if quarterly doses are entered in Item 12) should not exceed 1 1/4 rem.

If an individual is exposed under the provisions of Paragraph 20.101 (b), complete Items 14 through 18 at the end of each calendar quarter and when the sheet is filled. Values in Item 13, when in the middle of a calendar quarter, and values in Item 18, must be brought forward to next sheet for each individual.

- Item 14. Enter the previous total accumulated dose from previous dose records for the individual (e.g., from Item 16 of Form AEC-5 or NRC-5 or Item 11 of Form AEC-4 or NRC-4). The total occupational radiation dose received by the individual must be entered in this item, including any occupational dose received from sources of radiation not licensed by the Commission. If the individual was exposed to sources of radiation not licensed by the Commission during any calendar quarter after completing Form AEC-4 or NRC-4 and personnel monitoring equipment was not worn by the individual, it should be assumed that the individual received a dose of 1 1/4 rems during each such calendar quarter.
- Item 15. Enter the total calendar quarter dose from Item 13 (or from Item 12 if quarterly doses are entered in Item 12) and the date designating the end of the calendar quarter in which the dose was received (e.g., March 30, 1962).
- Item 16. Add Item 14 and Item 15 and enter that sum.
- Item 17. Obtain the Permissible Accumulated Dose (PAD) in rem for the WHOLE BODY. "N" is equal to the number of years of age of the individual on his last birthday. Subtract 18 from N and multiply the difference by 5 rem (e.g., John Smith, age 32; N = 32; PAD = 5(32-18) = 70 rem.)
- Item 18. Determine the unused part of the PAD by subtracting Item 16 from Item 17. The unused part of the PAD is that portion of the Lifetime Accumulated Dose for the individual remaining at the end of the period covered by this sheet.

PRIVACY ACT STATEMENT

Pursuant to 5 U.S.C. 552(a)(3), enacted into law by section 3 of the Privacy Act of 1974 (Public Law 93-579), the following statement is furnished to individuals who supply information to the Nuclear Regulatory Commission on Form NRC-5. This information is maintained in a system of records designated as NRC-27 and described at 40 Federal Register 45344 (October 1, 1975).

1. **AUTHORITY** Sections 53, 63, 65, 81, 103, 104, 161(b), and 161(c) of the Atomic Energy Act of 1954, as amended (42 U.S.C. 2073, 2093, 2095, 2111, 2133, 2134, 2201(b), and 2201(c)). The authority for soliciting the social security number is 10 CFR Part 20.
2. **PRINCIPAL PURPOSE(S)** The information is used by the NRC in its evaluation of the risk of radiation exposure associated with the licensed activity and in exercising its statutory responsibility to monitor and regulate the safety and health practices of its licensees. The data permits a meaningful comparison of both current and long-term exposure experience among types of licensees and among licensees within each type. Data on your exposure to radiation is available to you upon your request.
3. **ROUTINE USES** The information may be used to provide data to other Federal and State agencies involved in monitoring and/or evaluating radiation exposure received by individuals employed as radiation workers on a permanent or temporary basis and exposure received by monitored visitors. The information may also be disclosed to an appropriate Federal, State, or local agency in the event the information indicates a violation or potential violation of law and in the course of an administrative or judicial proceeding.
4. **WHETHER DISCLOSURE IS MANDATORY OR VOLUNTARY AND EFFECT ON INDIVIDUAL OF NOT PROVIDING INFORMATION** It is voluntary that you furnish the requested information, including social security number; however, the licensee must complete Form NRC-5 on each individual for whom personnel monitoring is required under 10 CFR 20.202. Failure to do so may subject the licensee to enforcement action in accordance with 10 CFR 20.601. The social security number is used to assure that NRC has an accurate identifier not subject to the coincidence of similar names or birthdates among the large number of persons on whom data is maintained.
5. **SYSTEM MANAGER(S) AND ADDRESS** Director, Office of Management Information and Program Control, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555.

INSTRUCTIONS FOR USE

This kit is designed for use on Tech/Ops Gamma Ray Projectors. It provides a convenient and safe method of performing leak tests of radiographic sources in accordance with NRC regulations, which require such tests at intervals of not more than 6 months.

CONTENTS

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

PROCEED IN THIS MANNER:

1. Be sure source is fully retracted and secured in the projector. (Use a survey meter to be sure that radiation levels are normal.)
2. Remove source guide tube from front of projector or remove shipping plug.
3. Wet the swab with EDTA solution. Shake off excess and insert the swab into the hole in the shield. Wipe the interior of the hole thoroughly by rotating swab holder.
4. Withdraw swab and place in plastic envelope.
5. The swab should now be monitored by turning the survey meter to its most sensitive range. Place the meter in a low background area and move the swab in its plastic envelope to the meter, not the meter to the swab.
6. If there is no indication on the meter, or if the indication is no more than 0.2 mR per hour above background, put the plastic envelope with the swab in the mailing box and mail to Tech/Ops, Incorporated, 40 North Ave., Burlington, Massachusetts 01803. Be sure to fill out and return the identification sheet.
7. If the swab should show more than 0.2 mR per hour, do not mail. Contact Tech/Ops, Inc., for specific instructions.

NOTE: If the survey meter available does not have the capability of detecting as little as 0.2 mR per hour, ship the wipe-test swab to Tech/Ops, Inc., via express. Do not ship if the radiation from the swab exceeds 2 mR per hour and contact Tech/Ops, Inc., for specific instructions. The wipe-test swab will be subjected to a precise radio-assay when received by Tech/Ops, and a leak-test certificate will be mailed promptly. The NRC requires that this certificate be kept with your records and that it be available for inspection (10 CFR 34.25(c)).

NOTICE

In order to use this Model 518 Leak Test Kit, the user must be specifically licensed to do so in accordance with Title 10, Code of Federal Regulations, Part 34, Paragraph 34.11 (f). If your license does not authorize the use of this leak test kit, an application for a license amendment should be filed on Form NRC-313R with the Materials Licensing Branch, Division of Fuel Cycle and Material Safety, Office of Nuclear Material Safety and Safeguards, U. S. Nuclear Regulatory Commission, Washington, DC 20555.

Use of this kit without specific authorization constitutes a violation of U. S. Nuclear Regulatory Commission regulations.

Tech/Ops, Inc.
Burlington, MA



40 NORTH AVENUE
BURLINGTON, MA 01804
(617) 272-2000

RECEIVED
JUL 1984
CC.

40

518
LEAK TEST

Co. Name Struthers Wells Corporation P.O. No. J8406-014
Street 1111 Fourth Avenue NRC # 37-11152-01
City, State Warren, Pennsylvania 16365 State License No. _____
Projector Model No. 151 Serial No. _____
Source Model No. 3330X 36907 Serial No. C-849 Curies 25
IR-192 _____ CO-60 _____ X _____ CS-137 _____ Other _____
Wipe Performed By C Rowles (C. Rowles) Date 7-10-84

The United States Nuclear Regulatory Commission requires that radiographic sources be tested for evidence of leaking at the time of manufacture and thereafter at not more than six-month intervals. The amount of removable contamination must not exceed 0.005 microcuries. If the test shows more than 0.005 microcurie of removable contamination, the source and equipment must be immediately taken out of service and be repaired or be disposed of. Please note that this source must be tested again on or before

FOR TECH-OPS USE ONLY

PROCESSED AT TECH/OPS ON 7/26/84
RADIOASSAY 2.001 MICROCURIE
TEST PERFORMED BY Alan C.
NEXT LEAK TEST DUE 1-10-85

ORIGINAL

Struthers

SECTION 11

WASTE MANAGEMENT

The disposal of licensed material shall be in accordance with Section 20.301 of 10 CFR Part 20. This licensed material will be disposed of by returning to the original supplier or to another specific licensee authorized to possess the licensed material. Certificates of these transactions shall be maintained on file by Struthers Wells Corporation.

RECEIVING REPORT



13609

RECEIVED FROM:

THIS IS YOUR ISOTOPE RECEIPT
KEEP IT FOR YOUR RECORDS

DATE: JUL 17 1990
PAGE: 1 OF 1

STROTHERS WELLS CORP.

1003 PENN AVE. W

WARREN, PA. 16365

Attn: Frank McElroy

CARRIER: FEDERAL EXPRESS

FREIGHT BILL #: 982 4810 936

PREPAID ☒ COLLECT ☐

RADIOACTIVE MATERIAL RECEIPT

MODEL # 650

SERIAL # 263

SALES ORDER # 21888

IN OVER PACK ☐

IN 715 S/N ☐
IN 6717 ☐

IN 683 S/N ☐
IN 9135 ☐

ISOTOPE:

IRIDIUM-192 ☒
CESIUM 137 ☐

COBALT 60 ☐
OTHER ☐

MODEL # 424-9

SERIAL # 5735

ACTIVITY 2.5 CURIES

MODEL # ☐

SERIAL # ☐

ACTIVITY ☐ CURIES

SURFACE RADIATION: 2 mR/hr

TRANSPORT INDEX: C.1

COMMENTS: _____

NON-RADIOACTIVE MATERIAL RECEIPT

CODE

1 2 3 4
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CODE:

1 = REPAIR/CALIBRATION

2 = C.E.R.A.

3 = AMERSHAM PROPERTY BEING RETURNED

4 = OTHER: _____

This form is to acknowledge that the materials listed above were received by Amersham Corporation. Please save this for your files.

RECEIVED BY: Arthur C. Leonini

JAN 16 1991

Struthers Wells Corporation
ATTN: J. C. Wallace, President
1003 Pennsylvania Avenue West
Warren, PA 16365-0008

Gentlemen:

This refers to your application dated December 7, 1990, for renewal of Materials License 37-11152-01.

We received your check for \$320. Your request, however, is subject to a renewal fee of \$1,400 as specified in fee Category 30 of §170.31, 10 CFR 170, which went into effect July 2, 1990. A copy of the May 23, 1990, Federal Register notice regarding the revision to the Commission's fee regulations is enclosed. Payment of the additional \$1,080 fee should be made to the U.S. Nuclear Regulatory Commission and mailed to the following address:

U.S. Nuclear Regulatory Commission
ATTN: Sandra Kimberley
License Fee and Debt Collection
Branch, OC/DAF
Mail Stop MNBB 4503
Washington, DC 20555

Your application will be processed by the Region I Licensing staff located at 475 Allendale Road, King of Prussia, Pennsylvania 19406. The fee, however, is required prior to issuance of the renewal. When submitting the additional fee, please refer to CONTROL NUMBER 113838.

If we do not receive a reply from you within 30 calendar days from the date of this letter, we shall assume that you do not wish to pursue your application and will void this action.

Sincerely,

Signed by
Maurice Messier

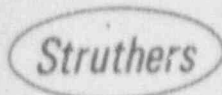
Maurice Messier
License Fee and Debt Collection Branch
Division of Accounting and Finance
Office of the Controller

Enclosure:
May 23, 1990 Federal Register notice

cc: Region I

DISTRIBUTION:
Pending Fee File OC/DAF R/F
LFDCB R/F (2) DW/RI/STRUTHERS

OFFICE: OC/LFDCB	OC/LFDCB	OC/LFDCB
SURNAME: SKimberley:bg	MMessier	GJackson
DATE: 1/16/91	1/16/91	1/16/91



Struthers Wells Corporation

P. O. BOX 9 • WARREN, PENNSYLVANIA 16385 • 814/726-1000

February 8, 1991

U. S. Nuclear Regulatory Commission
License Fee & Debt Collection Branch, OC/DAF
Mail Stop MNBB 4503
Washington, DC 20555

Attention: Ms. Sandra Kimberley

Reference: Control Number 113838
License Number 37-11152-01 & Amendments #1 thru #15

Subject: Additional Fee Required for Renewal

Dear Ms. Kimberley:

In response to Mr. Maurice Messier's letter of January 16, 1991, enclosed is a check for an additional \$1,080 fee for the renewal of our license referenced above.

We apologize for the error on our part for sending the incorrect amount initially, and thank you for your patience.

Thus, we await news of our license renewal from the Region I licensing staff in King of Prussia, PA.

Sincerely yours,

F. J. McElroy
Quality Assurance Manager, and
Radiation Safety Officer

ENCLOSURE (Check for \$1,080.00)

cc: Region I, King of Prussia, PA 19406
Q. A. File

BETWEEN:

LICENSE FEE MANAGEMENT BRANCH, ARM
AND
REGIONAL LICENSING SECTIONS

(FOR LFMS USE)
INFORMATION FROM LTS

PROGRAM CODE: 03310
STATUS CODE: 2
FEE CATEGORY: 30
EXP. DATE: 19910131
FEE COMMENTS: -----

LICENSE FEE TRANSMITTAL

A. REGION

1. APPLICATION ATTACHED

APPLICANT/LICENSEE: STRUTHERS WELLS CORP.
RECEIVED DATE: 901211
DOCKET NO: 3006249
CONTROL NO.: 113838
LICENSE NO.: 37-11152-01
ACTION TYPE: RENEWAL

2. FEE ATTACHED

AMOUNT: 300.00

CHECK NO.: 10-2315

3. COMMENTS

SIGNED -----

DATE -----

B. LICENSE FEE MANAGEMENT BRANCH (CHECK WHEN MILESTONE 03 IS ENTERED / ☒ /)

1. FEE CATEGORY AND AMOUNT: 30 \$1400

2. CORRECT FEE PAID. APPLICATION MAY BE PROCESSED FOR:

AMENDMENT -----

RENEWAL ☒ -----

LICENSE -----

3. OTHER -----

Send for
Collect R.I. as
diamond turnkey could
be sent.

SIGNED -----

DATE -----