

# INDUSTRIAL NDT SERVICES

DIVISION OF INDUSTRIAL HEAT TREATING AND METALLURGICAL COMPANY, INC.

NONDESTRUCTIVE TESTING SINCE 1951

2124 WENDELL AVENUE

P.O. BOX 2245

INDIANAPOLIS, INDIANA 46206

October 1, 1990

*Attachment A*

*Lisence File*

*13-06147-04*

U.S.N.R.C.  
Document Control Desk  
Washington, DC 20555

To Whom It May Concern:

Report of Gamma Radiography Incident:

This letter is written to comply with the requirements of 10 CFR Part 20.405-11.

Details of incident

Date: 9-12-90

Time: 8:00 p.m.

Personnel involved: [redacted] - Radiographer - [redacted] Date of Birth [redacted]

[redacted] Assistant Radiographer

Location: Major Tool & Machine Co.  
1458 E. 19th Street  
Indianapolis, IN 46218

Upon completion of an exposure with a 105 curie IR192 source, radiographer [redacted], approached the camera which was positioned on the step of a ladder, and started to lock the camera. The camera started to tip over. Mr. [redacted] grabbed the source tube where it connects to the camera and waited for assistant radiographer, [redacted] to help him. As Mr. [redacted] approached, he noticed his survey meter was full scale. Mr. [redacted] told Mr. [redacted] that the source must be stuck in the source tube. Mr. [redacted] then ran back with the crank handle approx. 10 ft. away and retracted the source. The crank handle moved about 1/3 of a revolution which would have positioned the source capsule barely out of the camera and possibly right next to Mr. [redacted] hand when he grabbed the source tube to steady the camera. Mr. [redacted] stopped operations and called Mike Thompson, the company RSO. Mr. [redacted] reported only 60 mr on his dosimeter, so we knew that his whole body radiation was minimal. Results from immediate processing of his film badge showed 120 mr total for September. Inverse square calculations the next day showed that maximum localized dose to Mr. [redacted] fingers was between 5 and 6 R. Calculations were based on the following:

$$I_2 = \frac{(557) (1)^2}{(.375)^2}$$

$$I_2 = \frac{557}{.141} = 3950 \text{ R/hr}$$

$$\frac{3950 \text{ R/hr}}{3600 \text{ sec/hr.}} = 1.1 \text{ R/sec.}$$

1.1 R/sec. X 5 second = 5.5 R total localized dose

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

TIME - Maximum of 5 seconds exposure

$I_1 = 5.3 \text{ R/hr X } 105 \text{ curies}$

$I_2 = \text{Unknown}$

$D_1 = 1 \text{ ft.}$

$D_2 = .375''$

This incident was due to an accident, however, I feel that the Radiographer could not have been watching his survey meter properly. Therefore corrective steps to prevent recurrence were to discuss the things that permitted the incident to happen and to issue a written warning to the employee for general negligence and improper use of survey meter.

If you need additional information or clarification, please contact Mike Thompson, Radiation Safety Officer at (317) 924-5127.

Respectfully submitted,

*James M. Thompson*

James M. Thompson,  
Radiation Safety Officer

cc: U.S.N.R.C.  
799 Roosevelt Rd.  
Glen Ellyn, IL 60137

JMT/jb

**INDUSTRIAL NDT SERVICES**  
 DIVISION OF INDUSTRIAL HEAT TREATING AND METALLURGICAL COMPANY, INC.  
 PRODUCES PRODUCTIVE TESTING SINCE 1951  
 2124 WENDELL AVENUE P.O. BOX 2248 INDIANAPOLIS, INDIANA 46201

October 1, 1990

*Attachment B*

U.S.N.R.C.  
Document Control Desk  
Washington, DC 20555

To Whom It May Concern:

Report of Gamma Radiography Incident:

This letter is written as a revision to the original letter dated 10-01-90 to correct errors in the original calculations.

Details of incident

Date: 9-12-90

Time: 8:00 p.m.

Personnel involved: [redacted] - Radiographer - SS# [redacted] Date of Birth [redacted]

[redacted] - Assistant Radiographer

Location: Major Tool & Machine Co.  
1458 E. 19th Street  
Indianapolis, IN 46218

Upon completion of an exposure with a 105 curie IR192 source, radiographer, [redacted], approached the camera which was positioned on the step of a ladder, and started to lock the camera. The camera started to tip over. Mr. [redacted] grabbed the source tube where it connects to the camera and waited for assistant radiographer [redacted] to help him. As Mr. [redacted] approached, he noticed his survey meter was full scale. Mr. [redacted] told Mr. [redacted] the the source must be stuck in the source tube. Mr. [redacted] then ran back with the crank handle approx. 10 ft. away and retracted the source. The crank handle moved about 1/3 of a revolution which would have positioned the source capsule close to the opening of the camera and possibly right next to Mr. [redacted] hand when he grabbed the source tube to steady the camera. Mr. [redacted] stopped operations and called Mike Thompson, the company RSO. Mr. [redacted] reported only 60 mr on his dosimeter, so we knew that his whole body radiation was minimal. Results from immediate processing of his film badge showed 120 mr total for September. Inverse square calculations the next day showed that maximum localized dose to Mr. [redacted] fingers was approx. 110 R. Calculations were based on the following:

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At the part of hand closest to the source capsule:

$$I_2 = \frac{(557 \text{ R/hr}) (12")^2}{(1")^2} = 80,208 \text{ R/hr}$$

$$\frac{80,208 \text{ R/hr}}{3600 \text{ Sec/hr}} = 22.28 \text{ R/sec.}$$

$$22.28 \text{ R/sec} \times 5 \text{ second exposure} = 111.4 \text{ R exposure}$$

At the part of hand furthest from source capsule:  
(Not accounting for shielding from rest of hand)

$$I_2 = \frac{(557 \text{ R/hr}) (12")^2}{(5")^2} = 3208.32 \text{ R/hr}$$

$$\frac{3208.32 \text{ R/hr}}{3600 \text{ Sec./hr}} = .89 \text{ R/sec.}$$

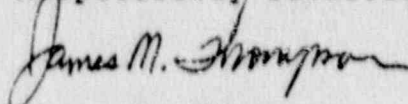
$$.89 \text{ R/sec.} \times 5 \text{ second exposure} = 4.45 \text{ R exposure}$$

The  $D_2$  was estimated using figures from Kate Roughan, RSO at Amersham Corp. She made measurements using a dummy source and found that at 1/3 to even 1/2 of a turn of the crank handle, the source did not go past the camera opening. She estimated the part of the hand closest to source to be 1".

This incident was due to an accident, however, I feel that the radiographer could not have been watching his survey meter properly. Therefore, corrective steps to prevent recurrence were to discuss the things that permitted the incident to happen and to issue a written warning to the employee for general negligence and improper use of survey meter.

If you need additional information or clarification, please contact Mike Thompson, Radiation Safety Officer at (317) 924-5127.

Respectfully submitted,



James M. Thompson,  
Radiation Safety Officer

cc: U.S.N.R.C.  
799 Roosevelt Rd.  
Gen Ellyn, IL 60137

JMT/jb

ATTACHMENT C  
EQUIPMENT LIST

Exposure Device Manufacturer:	Gamma Industries
Exposure Device Model:	Century SA
Exposure Device Serial Number:	2040
Isotope:	Iridium 192
Activity:	105 Curies
Isotope Serial Number:	E.1-83
Guide Tube:	7' in length
Control Cable:	25' in length