

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 030-10856/85002(DRSS)

Docket No. 030-10856

License No. 13-16347-01

Category C1

Priority 1

Licensee: Calumet Testing Services, Inc.
1945 N. Griffith Boulevard
Griffith, Indiana 46319

Inspection Conducted: June 21, 25 and 29, and July 16, 1985

Enforcement Conference: July 8, 1985

Inspectors: G. L. Shear

Radiation Specialist

G. L. Shear

7/12/85
Date

R. J. Caniano

Radiation Specialist

R. J. Caniano

7/12/85
Date

R. E. Burgin

Senior Radiation Specialist

Robert E. Burgin

7/12/85
Date

J. R. Madera

Licensing Reviewer

J. R. Madera

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7/16/85
Date

Inspection Summary

Inspection on June 21, 25 and 29, and July 16, 1985 (Report
No. 030-10856/85002(DRSS))

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Areas Inspected: Special, announced safety inspection to review circumstances surrounding a reported overexposure of an assistant radiographer. The inspection included a review of the licensee's organization; inspection history; training; internal audits; inspection and maintenance of devices; utilization logs; leak tests; surveys, posting, and area security; and personnel monitoring. In addition to the above areas, the inspector performed an onsite inspection of a radiographic field operation on June 29, 1985.

Results: Of the areas inspected, three violations were identified:

(1) 10 CFR 20.101(a) individual received extremity exposure exceeding quarterly limits (Section 12); (2) 10 CFR 34.43(b) - licensee failed to perform a survey after each radiographic exposure to determine the sealed source had returned to its shielded position (Section 5); and (3) 10 CFR 34.44 - two assistant radiographers performed radiographic operations without the personal supervision of a radiographer.

DETAILS

1. Persons Contacted

- +*Thomas A. Schumacher, Radiation Health Section, Indiana State Board of Health
- +*Andrew G. Welding, Radiation Health Section, Indiana State Board of Health
- +Robert J. Vidimos, President, Calumet Testing Services, Inc.
- +John Korienek, RSO and Manager, Calumet Testing Services, Inc.
 - Individual A, Radiographer, Calumet Testing Services, Inc.
 - Individual B, Assistant Radiographer, Calumet Testing Services, Inc.
 - Individual C, Assistant Radiographer, Calumet Testing Services, Inc.

+Denotes those present at the exit meeting on June 21, 1985.

*Accompanied the NRC inspectors for a portion of the inspection.

2. Purpose of Inspection

This was a special inspection to review the circumstances surrounding an apparent radiation overexposure to an assistant radiographer that occurred during field operations in Burns Harbor, Indiana on June 14, 1985. The licensee's President reported this incident by telephone to NRC Headquarters on June 15, 1985. The film badge worn by the individual was processed on an emergency basis on June 15, 1985 and indicated a whole body dose of 1,660 millirem. NRC calculations based upon time and distance estimates showed a hand and finger dose in the range 381 to 954 rems. (Attachment B)

3. Organization

The President of Calumet Testing Services, Inc. is Mr. Robert Vidimos. Mr. John Korienek is Radiation Safety Officer and Manager of nondestructive testing. The licensee currently employs approximately twelve radiographers and six assistant radiographers.

No violations were identified.

4. Licensed Program and Inspection History

NRC Byproduct Material License No. 13-16347-01 was originally issued to Calumet Testing Services, Inc. (CTS) on May 13, 1975 and was last renewed in its entirety via Amendment No. 7 on April 15, 1982. Since originally issued, the license has authorized possession of iridium-192 sealed sources for the purpose of industrial radiography at the licensee's facility and also at temporary job sites of the licensee anywhere in the U.S. where the NRC maintains jurisdiction for regulating the use of byproduct material. The license currently authorizes up to 100 curies per device of iridium-192 and cobalt-60 for such uses. The license also authorizes the possession of cesium-137 sealed sources for use in a dosimeter calibrator.

Over the last ten years, the licensee has been inspected ten times. The last inspection was on February 14, 1985 and no violations were identified. A special inspection was performed on December 13, 1983 as a result of allegations received by Region III. No violations were identified during the course of that inspection. A special inspection was performed on June 20, 1983 to review circumstances surrounding reported overexposures to licensee radiographic personnel. That inspection identified four violations and resulted in a \$4000 civil penalty. A special inspection was performed on August 14, 1981 in response to a possible extremity radiation overexposure incident that occurred on August 13, 1981. As a result of this special inspection, three violations were identified. However, NRC determined extremity exposures were less than 10 CFR 20.101(a) limits. Routine inspections performed over the past ten year period resulted in from none to four violations, per inspection.

5. Review of June 14, 1985 Incident

On June 14, 1985 Individuals B and C were performing radiographic exposures of furnace boiler tubes using a 61 curie iridium-192 source in a Gamma Industries Century S exposure device. The work was being performed at a temporary job site in Burns Harbor, Indiana. A calibrated Eberline Model E-130 survey meter was available for performing radiation surveys.

Records for June 14, 1985 revealed that individuals performed the required surveys of unrestricted areas. The surveys showed that radiation levels were below the 2 mR/hr level.

Individuals B and C were both radiographer's assistants and were working together (unsupervised) at the time of the incident. Individual B stated that after the ninth exposure that evening, he approached the exposure device with a survey meter. He noticed that the meter was reading approximately 10 mR/hr, which was about the same as the previous exposures due to the radiographic operations being performed approximately forty feet above them. Individual B approached to within three feet of the exposure device and set the survey meter down to crawl under some piping to reach the exposure device. When Individual B reached the exposure device, he locked the device, reached for and grabbed the guide tube disconnect with his left hand and held the exposure device with his right hand. He then disconnected the guide tube from the exposure device. At this point, he realized something was wrong and looked at the guide tube. He saw that the source was still exposed and had not retracted fully into its shielded position within the exposure device. Individual B dropped the guide tube and retreated as quickly as possible. An NRC reenactment of the event showed Individual B held the guide tube with the source exposed for 2 to 5 seconds.

Individual B explained to Individual C what had happened and both individuals reentered the area with a survey meter to unlock the exposure device and retract the source into its proper, shielded storage position. A final survey was then made to verify that the source had retracted, fully into the exposure device.

Individual C reported the incident and possible overexposure to Individual A, a Calumet Testing Services, Inc. radiographer working at another location near the area. Individual A reviewed the incident with Individual B and attempted to contact the RSO. The RSO was not available and a decision was made to discontinue all radiographic exposures for that shift and return to the Calumet Testing Services, Inc. (CTS) shop. When Individuals A and B arrived back at the CTS shop, Individual B contacted the RSO and was instructed to leave his film badge for emergency processing.

On June 15, 1985 Individual B's film badge was sent to R. S. Landauer, Jr. and Company in Glenwood, Illinois for emergency processing. R. S. Landauer Jr. and Company reported that the film badge revealed a 1.660 rem whole body dose.

The licensee contacted Health Physics Associates, Ltd. of Northbrook, Illinois for consultation and guidance. The licensee then contacted the NRC and reported the incident.

On June 21, 1985, two Region III inspectors, reviewed the incident with Calumet Testing Services, Inc. personnel at the CTS corporate office. Individual B stated that he recalled locking the exposure device after the ninth exposure and did not have any indication that the source was exposed until he disconnected the guide tube and saw the exposed source. Individual B stated that he did not do a survey of the exposure device and guide tube after the exposure.

The RSO was asked by the inspectors if it is common for two assistant radiographers to perform radiographic exposures together without personal supervision of a radiographer. He stated that it has never happened before and was the result of scheduling difficulties on that day.

The failure to perform a survey of the exposure device and guide tube to determine that the sealed source had been returned to its shielded position constitutes a violation of 10 CFR 34.43(b). Two assistant radiographers performing radiographic operations without the personal supervision of a radiographer constitutes a violation of 10 CFR 34.44.

Two violations were identified.

6. Training

The licensee's training program is described in Attachment 6F of the licensee's April 1, 1982 application. This attachment outlines specific training including topics covered and time devoted to each, that an individual must successfully complete in order to be qualified as a radiographer or radiographer's assistant. The extent of training depends upon the individual's previous radiography experience. The training program is given in-house and includes classroom type lectures using video tapes, hands-on demonstrations, oral and written exams, and on-the-job training. Retraining consists of semiannual review tests given to all radiographers and assistants and other refresher information via posted bulletins, distributed material, and special lectures. The program is administered by the RSO.

The individual involved in the June 14, 1985 incident had no prior radiography training or experience when hired by the licensee. The individual successfully completed the licensee's established radiographic training program and appeared to be adequately trained in his assistant radiographer position.

No violations were identified.

7. Internal Audits

The RSO conducts an internal inspection relating to safety and NRC compliance every three months. The inspection consists of unannounced on-the-job audits of radiographic operations to determine if individuals are performing radiography in a safe manner. Records of these audits were maintained by the RSO.

No violations were identified.

8. Inspection and Maintenance of Devices

The procedures for inspection and maintenance of devices are outlined in the licensee's operating and procedure manual. This consists of a daily equipment check of the devices and accessories to assure all equipment is functioning properly. In addition, the RSO performs a quarterly inspection of all radiographic equipment. Records of the inspections were maintained by the RSO.

No violations were identified.

9. Utilization Logs

Each time radiographic work is performed, the radiographer enters the following information on the utilization logs.

- a. date source and exposure device checked out
- b. radiographer and assistant radiographer
- c. exposure device identification
- d. radioisotope, serial number, and activity of source
- e. location of radiography site

Utilization logs for the date of the incident were reviewed by the inspectors and found to be adequate.

No violations were identified.

10. Leak Tests

Sealed source leak tests were performed by the RSO using a Health Physics Associates, Ltd. leak test kit. Tests were analyzed by Health Physics

Associates Ltd. Tests were performed every six months. Records were maintained by the RSO.

The inspectors reviewed leak test records for the iridium-192 source involved in the incident. The last leak test was performed April 22, 1985 and showed less than 0.005 microcuries of removable contamination.

11. Surveys/Posting/Area Security

- a. Radiographic personnel stated radiation surveys were performed at the boundary of restricted areas during the Burns Harbor field operation on June 14, 1985. Records showed that radiation levels at the boundary of restricted areas were 1.0 millirem/hr or less.

With the exception of the incident outlined in Section 5 of this report, radiation surveys were taken of the exposure device and guide tube after each exposure to assure that the source has been returned to the shielded position. A final survey was performed when radiographic exposures were suspended and direct surveillance was no longer provided.

- b. Areas where radioactive materials are stored and devices in which radioactive materials are used were posted and labeled in accordance with applicable sections of 10 CFR 20.203.
- c. During the Burns Harbor radiographic operation, the radiographic personnel indicated that they maintained surveillance of the operation to protect against unauthorized entry into the high radiation area. Areas were roped and posted to control access to restricted areas.

No violations were identified except as noted in Section 5.

12. Personnel Monitoring

- a. Film badge service is provided by R. S. Landauer, Jr. and Company. All personnel involved in radiographic operations are provided with monthly whole body film badges and direct reading 0-200 milliroentgen dosimeters which were read after each day of radiographic work.
- b. During this special inspection the NRC inspectors reviewed film badge records for Individual B for the second quarter of 1985. The records showed a whole body radiation dose of 1.660 rems for the period June 1-14, 1985. The quarterly radiation dose for the whole body was 2.46 rems. The quarterly radiation dose limit for Individual B is 3 rems since a Form NRC-4 has been completed.
- c. On the evening of June 14, 1985 Individual B received a radiation dose to his left hand and fingers calculated by the NRC to be in the range of 381 rems to 954 rems. The licensee's consultant calculated a range of 244 rems to 5786 rems. The quarterly radiation dose limit to the hands and fingers is 18.75 rems. This constitutes a

violation of 10 CFR 20.101(a) since an individual received an exposure to the left hand and fingers of greater than 18.75 rems during a calendar quarter.

One violation was identified.

13. Field Site Inspection

On June 29, 1985 inspectors from the NRC, Region III office accompanied by the Calumet Testing Services, Inc. RSO, performed an unannounced, field inspection of licensed activities at the Amoco Oil Tank Farm in Hammond, Indiana. The inspection included: observation of three radiographic exposures; verification of restricted boundaries; review of utilization log; interview with radiographic personnel; verification of use of personnel monitoring devices and survey meters.

No violations were identified.

14. Medical Consultation

On June 15, 1985, Individual B was instructed by the licensee to go to a hospital emergency room to get a complete blood count. This blood count was performed at Silver Cross Hospital in Joliet, Illinois.

On June 20, 1985, a sample of Individual B's blood was submitted to the University of Pittsburgh for a chromosome aberration study.

On June 27, 1985, Individual B was instructed by the licensee to see a radiotherapist. Individual B saw a radiotherapist at St. Joseph Hospital in Joliet, Illinois and had a second complete blood count and a physical examination of his hand.

The results of all medical examinations to date have been normal.

15. Notifications and Reports

The licensee reported the June 14, 1985 incident to the NRC by telephone on June 15, 1985. The NRC received a written report of the incident on July 2, 1985 as required by 10 CFR 20.405. (Attachment A)

No violations were identified.

16. Chromosome Study Analysis

On July 16, the NRC received information from Dr. N. Wald (University of Pittsburgh) that the chromosome study performed on Individual B's blood sample submitted June 20, 1985, showed slightly positive indications, the equivalent of 0 to 20 rem whole body dose. This represents the low limit of detectability for this technique.

17. Exit Interview

An exit interview was held at the licensee's facility on June 21, 1985. Licensee attendance at this meeting is indicated in the Persons Contacted section of this report. The violations as well as the NRC policy regarding enforcement were discussed.

18. Enforcement Conference

On July 8, 1985, an enforcement conference was held with licensee management personnel denoted in Paragraph 1. The scope, purpose and findings of the NRC inspection were discussed. Mr. Vidimos, President of CTS stated his corrective action was limited to meeting with each of the radiographers and radiographer's assistants and emphasizing the importance of following safety procedures and NRC regulations. The NRC staff explained that because of CTS's previous enforcement history and failure to take effective corrective action a significant effort by the licensee was required to give NRC assurance that CTS could run a safe industrial radiography program. Mr. Vidimos agreed that he would formulate a regulatory improvement program and submit it to Region III for review and approval. After the NRC staff had approved the proposed program, it would be confirmed in a Confirmatory Order.

Attachments:

1. Attachment A, Licensee's
rpt of the incident dtd
06/28/85
2. Attachment B, NRC Dose
Assessment