

APPENDIX

U. S. NUCLEAR REGULATORY COMMISSION
REGION IV

Inspection Report: 30-12319/92-02

License: 35-17178-01

Licensee: Tulsa Gamma Ray, Inc.
1127 South Lewis Avenue
Tulsa, Oklahoma 74104

Inspection At: Tulsa Gamma Ray, Inc.
Tulsa, Oklahoma

Valmont Industries (Licensee's temporary jobsite)
Tulsa, Oklahoma

Inspection Conducted: September 30 through October 6, 1992

Inspector: Linda L. Kasner, Senior Radiation Specialist

Approved:

Charles L. Cain
Charles L. Cain, Chief, Nuclear Materials
Inspection Section

12/31/92
Date

Inspection Summary

Areas Inspected: Special, unannounced radiation safety inspection conducted to review industrial radiography operations performed by licensee personnel at a temporary jobsite.

Results:

- An apparent violation involving a failure to physically secure or maintain direct surveillance of a radiographic exposure device containing licensed material while work was performed at a temporary jobsite was identified. Licensee personnel left an exposure device unattended in an unrestricted area, and members of the public later entered the area and were working near the device.
- Based on the inspection findings, no undue radiation exposure of members of the public occurred.
- A concern was identified regarding the licensee's failure to recognize that the failure to maintain surveillance over the exposure device constituted a possible violation of NRC requirements.

- A concern was identified regarding the adequacy of the licensee's evaluation of potential radiation dose(s) received by members of the public who were later found working in the area.

Summary of Inspection Findings:

- An apparent violation of 10 CFR 20.207(b) was identified. (Section 3)

Attachments:

- Attachment - Persons Contacted and Exit Meeting

DETAILS

1 BACKGROUND

1.1 Initial NRC Contact

On September 24, 1992, personnel employed by a licensee customer (customer) contacted NRC staff to discuss questions regarding an incident which occurred at Valmont Industries, a temporary jobsite for the licensee. The principle subject discussed with NRC staff members involved customer employees' observations of Tulsa Gamma Ray (TGR) personnel who conducted industrial radiography at the Valmont facility in Tulsa, Oklahoma, on the morning of September 1, 1992.

According to the report provided to NRC, customer employees arrived at the Valmont facility at approximately 6:00 a.m. on September 1, to begin welding operations. Upon arrival at the Valmont facility, customer employees entered the north side of a welding bay. One customer employee observed an individual who was identified as a TGR radiographer laying on the ground outside the bay door on the north side of the building. After entering the building and beginning their normal work routine, customer employees noted that a radiographic exposure device had been left positioned near a steel cylinder that had been scheduled for radiography earlier that morning. In addition, the employees noted that a source guide tube was still connected to the exposure device and that the drive cables and a survey instrument were positioned on the bay floor near the exposure device. Customer personnel also reported that it appeared that radiography was underway at the time although the radiographer was not present and was still located outside the building at the time. One individual approached the survey instrument, which was positioned on the floor near the exposure device, and observed some deflection of the meter needle although he was uncertain what the observation indicated.

NRC staff was also informed that the customer employees had discussed their observations with the licensee's radiation safety officer during a visit to the Valmont facility one or two days later. (NRC had not been notified of any incident by the licensee.) The customer personnel reported that the licensee's radiation safety officer informed them that they had not received any radiation exposure that would harm them.

A NRC inspector was assigned to discuss the incident with the customer personnel and to review the licensee's evaluation of the incident.

1.2 Summary of Work Performed by TGR at Valmont Industries

TGR has provided nondestructive testing services for Valmont Industries (Valmont) for a period of years. Valmont, a corporation involved in many industrial ventures, operates a fabrication shop in Tulsa, Oklahoma, which employs approximately 100 individuals. Valmont routinely operates two shifts, with the second shift concluding work at approximately 2:00-2:30 a.m. According to arrangements between Valmont and TGR, TGR is not permitted to

conduct radiography at the Valmont facility until the second shift has concluded work for the day. TGR radiographers routinely report for duty at Valmont at approximately 2:30 a.m. and work unsupervised until the day shift reports for duty between 5:30-6:00 a.m. TGR had recently assigned a single radiographer to work at the Valmont facility, although they have used two individuals at Valmont on several occasions depending on the work load.

On September 1, TGR was requested to radiograph several steel cylinders. The TGR radiographer last worked on a 7-foot long, 25-inch diameter (internal) "shell" with a wall thickness of 1.25 inches. The cylinders, or shells, were located in a bay area on the northeast corner of the fabrication building. According to Valmont employees, there were at least six or seven such shells in the bay on September 1, 1992.

2 SUMMARY OF ACTIVITIES ON SEPTEMBER 1, 1992 (87100)

The radiographer assigned to Valmont on September 1 began his work after the second shift of Valmont employees finished work at approximately 2:15-2:30 a.m. The radiographer's work that morning involved radiography of some weld repairs and "long seams" for rolled steel cylinders. The radiographer noted that although he had not completed all of the radiographs requested by the customer, he stopped work at approximately 5:15-5:30 a.m.

Having terminated radiography for the morning, the radiographer gathered the ropes which were used to provide a barrier around the bay area, along with the radiation and high radiation area signs that were used to post the area, and stored them in his transport vehicle. The radiographer stated that he then disconnected the drive cables from the exposure device he was using (a Tech Ops/Amersham Model 660, Serial No. 813), left the drive cables stretched out on the floor, and locked the exposure device. At the time, the exposure device was located on the east side of the last cylinder that was radiographed, and the survey instrument that the radiographer had used earlier was left on the floor near the exposure device. The radiographer left the source guide tube, which was still connected to the exposure device, positioned inside the cylinder and walked outside the building.

Once outside the building, the radiographer sat down on the east side of the bay door, approximately 10-12 feet away from the door where the exposure device was shielded from his view, to smoke a cigarette. While he was outside, the radiographer laid back on the ground to relax. The radiographer estimated that he remained outside the bay area for at least 10-15 minutes and acknowledged that he was aware that customer employees were arriving for work during this interval. (During this period, the radiographer was approximately 30-40 feet from the exposure device, and his view of the device would have been obstructed by a large dumpster located just inside of the bay door.)

The first customer employee arrived at the facility at approximately 5:20 a.m. and entered the north side of the fabrication building from the west. This individual proceeded to sweep the bay area and noticed that the exposure device was positioned with the guide tube extended into the cylinder. The

individual later stated that at the time, he thought the radiographer was developing film or working in his truck which was parked nearby. He noted that there were no ropes or signs in the area.

A second individual arrived approximately 20-30 minutes later and observed the radiographer laying on the ground outside the northeast bay door. This individual stated that he walked within feet of the radiographer to enter the building; however, the radiographer didn't move or acknowledge his presence. The second individual later stated that he initially thought that another radiographer was probably working inside the bay. He also noted that there were no ropes or signs in the area.

The two customer employees gathered inside the building, near the northeast bay door, and remained there for several minutes talking with other employees who arrived at approximately the same time but had entered the building through other doors. The group, which now consisted of four customer employees, departed to perform various activities in the bay area.

Several minutes later (approximately 10-15 minutes), one of the individuals noticed the configuration of the exposure device and guide tube and became concerned that a radiograph was being taken at the time. The individual approached the exposure device and survey instrument which was sitting approximately 1 foot from the device (between the exposure device and the cylinder). Although the individual was not familiar with the use of a survey instrument, he noted that the needle was deflected toward the number "10" which was indicated on the meter face. The individual gathered the remainder of the customer personnel and instructed them to vacate the bay area.

Shortly after the other individuals were alerted, a foreman arrived at the fabrication building, and the radiographer reported to his office to discuss the work performed earlier that morning. During this discussion, several of the customer employees were present in the foreman's office, and each reported that the radiographer appeared disoriented in that he "was confused about what day it was." Following this conversation, and at the request of the foreman, the radiographer packed the remainder of his equipment in his vehicle and departed from the Valmont facility.

The foreman later discussed his and the other employees' observations with a quality control manager and the Valmont Safety Director. The Safety Director discussed the employees' observations and concerns with TGR's Radiation Safety Officer later that day.

In response to the discussion with Valmont employees, TGR's Radiation Safety Officer discussed the incident with the radiographer. Based on this initial discussion, the Radiation Safety Officer determined that the radiographer's account of the incident was correct and that the source was retracted and locked in the exposure device at the time that Valmont employees arrived at the facility. However, because of the concern expressed by Valmont employees, the Radiation Safety Officer performed a simple evaluation of the potential radiation levels in the area had the source been fully exposed within the

steel cylinder. According to the Radiation Safety Officer's calculations, radiation levels in the area where Valmont employees had gathered to talk were approximately 1.03 millirem per hour (mr/hr). (This calculation was based upon at a distance of 20 feet with an additional cylinder between the Valmont employees and cylinder holding the source guide tube. The calculations also accounted for the use of a tungsten collimator and a 49 curie iridium-192 source.)

The Radiation Safety Officer met with Valmont employees on September 3 to discuss their questions. During this meeting, the Radiation Safety Officer attempted to explain the radiographer's account of the incident. However, he noted that even if the source was not fully shielded at the time, according to his calculations, the Valmont employees would have received a dose of approximately 20 millirems. Valmont employees stated that the Radiation Safety Officer assured them that an exposure of this magnitude would not harm them.

In response to questions regarding the lack of ropes and signs when the Valmont employees arrived, the Radiation Safety Officer explained that if radiography was not underway the ropes and posting were not required. In addition, the Radiation Safety Officer addressed one individual's question regarding the observation of the survey instrument. According to Valmont employees, he explained that the instrument may have been set to "battery check" or that the needle may have been deflected due to expected radiation levels near the surface of the exposure device while the source was shielded.

3 INDUSTRIAL RADIOGRAPHIC OPERATIONS (87100)

Based upon information obtained during interviews of TGR and Valmont employees, as described above, the inspector concluded that the accounts provided by TGR and the Valmont employees were basically consistent with regard to the nature of the activities that occurred on September 1 and the time(s) that the activities took place. The radiographer acknowledged during interviews with the inspector that he had left the exposure device unattended for a period of time and that the area was not restricted from entry or posted at the time. The failure to physically secure or to maintain direct surveillance over an exposure device containing licensed material, located in an unrestricted area and not in storage, was identified as an apparent violation of 10 CFR 20.207(b).

Although the radiographer was unable to account for the length of time that he was absent from the bay area, he acknowledged that he was aware that Valmont employees were present during this period. Further, the radiographer acknowledged that he was tired on the morning of September 1, although he did not recall all details of his conversation with the Valmont foreman.

The licensee's Radiation Safety Officer also confirmed the radiographer's description of the circumstances and noted that in his opinion, the radiographer's account was reliable. However, although the licensee had discussed concerns related to this incident with the radiographer, licensee

management had not specifically discussed potential violations of NRC requirements with the radiographer. Specifically, the Radiation Safety Officer noted that he had not recognized the failure to maintain surveillance over the exposure device as a possible violation of regulatory requirements. This was identified as a concern with licensee management in that the individuals responsible for executing and supervising licensed operations were not familiar with this requirement.

4 SURVEYS AND EVALUATIONS (83822)

The inspector reviewed the Valmont employees' accounts of their activities on September 1, as well as the licensee's evaluation of the incident. Although the inspection findings did not appear to indicate that the drive cables were connected to the exposure device at the time that Valmont employees were located near the exposure device or source guide tube, one concern was noted regarding the licensee's initial exposure evaluation.

After receiving Valmont's initial report of the incident, the Radiation Safety Officer performed a simple exposure rate calculation as described in Section 2. However, the Radiation Safety Officer failed to obtain sufficient information from Valmont employees regarding the exact location of each employee during the period that they had worked in the bay area while the exposure device was present. Specifically, the Radiation Safety Officer did not know that one individual was working near the open end of the cylinder, unshielded by the cylinder wall. Had the source been exposed during this period, the evaluation performed by the licensee (which was intended to determine the exposure of Valmont personnel if the source was exposed) would have been inadequate. This issue was discussed with the Radiation Safety Officer and was noted as an item worthy of further review during future evaluations.

ATTACHMENT

1 PERSONS CONTACTED

1.1 Licensee Personnel

Joe Bremer, Radiographer
James Moss, President
*Peter Moss, Radiation Safety Officer

*Denotes individuals present during the telephonic exit briefing conducted on December 30, 1992.

The inspector also communicated with other licensee personnel during the course of the inspection.

1.2 Valmont Personnel

James Harvey, Welder
David Jones, Welder
Carl Lance, Quality Control Manager
Cliff Morris, Foreman
John Pearson, Mechanic
Tony Schuler, Safety Director

2 EXIT BRIEFING

On December 30, 1992, the inspector conducted a telephonic exit briefing with the licensee representatives noted above. The inspector reviewed her findings as presented in this report, with specific focus on the apparent violation discussed in Section 3. The inspector informed licensee representatives that they would be contacted at a later date to schedule an enforcement conference.