

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

INSPECTION REPORT

Inspection No. 03020243/2008001
Docket No. 03020243
License No. 47-23076-01
EA No. EA-08-303
Licensee: Huntington Testing and Technology, Inc.
Mailing Address: 1200 Airport Road
Huntington, West Virginia 25530
Location Inspected: 925 Ulrich Avenue
Louisville, Kentucky 40219
Inspection Dates: September 10-12, 2008
Exit Meetings via Telephone: October 15, 2008 and October 28, 2008

Inspector:	<u><i>/RA M. T. Miller for/</i></u>	<u>12/08/08</u>
	Kathy Dolce Modes Health Physicist	date
Approved By:	<u><i>/RA/</i></u>	<u>12/08/08</u>
	Marie Miller, Chief Materials Security and Industrial Branch Division of Nuclear Materials Safety	date

EXECUTIVE SUMMARY

Huntington Testing and Technology, Inc.
NRC Inspection Report No. 03020243/2008001

A reactive safety inspection was conducted at Huntington Testing and Technology's field office in Louisville, Kentucky to review the circumstances surrounding the crimped guide tube and subsequent source retrieval event that occurred on August 20, 2008, in Madison, Indiana.

On September 3, 2008, Huntington Testing and Technology's Corporate Radiation Safety Officer (RSO) notified the NRC Headquarters Operations Office of a safety equipment failure involving a QSA Global Model 880 Sigma radiography camera. Between September 10 and 12, 2008, the NRC conducted an inspection regarding this event, which was also observed by three representatives from the Kentucky Department of Public Health. Within the scope of this inspection, three apparent violations of the NRC regulations were identified:

License Condition 17 of NRC License No 47-23076-01 states that the licensee is authorized to conduct source retrieval activities in accordance with the letter dated March 14, 2005. This letter authorizes the Corporate RSO to conduct source retrievals and in Section 4.4 from Emergency Procedure 7, clearly states in part, that if the radioactive source cannot be returned to the device, the RSO shall be notified and no attempts shall be made by radiographic personnel to either retrieve or "shield-down" the source. On August 20, 2008, personnel not trained or authorized conducted source retrieval activities and shielded-down the source.

10 CFR 30.50(b)(2)(i) requires, in part, that each licensee shall notify the NRC within 24 hours after an event in which equipment is disabled or fails to function as designed when the equipment is required by regulation to prevent exposures to radiation and radioactive materials exceeding regulatory limits. Between August 20, 2008 and September 3, 2008, the licensee had an event where equipment (a source guide tube attached to a QSA Global Model 880 Sigma radiography camera) was disabled and the licensee did not notify the NRC until September 3, 2008.

10 CFR 34.47(d) requires, in part, that if an individual's pocket chamber (also known as a pocket dosimeter or PD) is found to be off-scale, and the possibility of radiation exposure cannot be ruled out as the cause, the individual's personnel dosimeter must be sent for processing within 24 hours. Between August 20 and 22, 2008, the Kentucky RSO's pocket chamber went off-scale due to the source retrieval event and the Kentucky RSO's personnel dosimeter was not sent in for immediate analysis within 24 hours. The dosimeters were mailed on August 22, 2008.

This inspection report provides additional details regarding these three apparent violations.

REPORT DETAILS

I. Organization and Scope of the Program

a. Inspection Scope

The inspection included a review of the licensee's organization and scope of activities related to industrial radiography activities conducted on August 20, 2008.

b. Observations and Findings

Huntington Testing and Technology, Inc. (HTandT) is a non-destructive testing and heat treatment company with a corporate office in Huntington, West Virginia and a field office in Louisville, Kentucky. The West Virginia office maintains an NRC License, while the Kentucky office maintains an Agreement State license. Both licenses authorize HTandT to conduct industrial radiography.

On the evening of Wednesday, August 20, 2008, HTandT was scheduled to conduct radiographic operations at the IKEC Power Plant in Madison, Indiana. Since Indiana is not an Agreement State, HTandT conducted industrial radiography in Madison, IN under their NRC license, but with personnel deployed from their Kentucky office. The distance between the Kentucky office and IKEC was approximately 60 miles; much closer than if deployed from the West Virginia office.

c. Conclusions

No safety concerns or violations identified.

II. Source Retrieval

a. Inspection Scope

The inspection included interviews with licensee staff involved in the event, a review of selective records associated with this event, re-enactments by the licensee's staff to observe techniques used during the event, and a review of the licensee's event report and thirty-day written report.

b. Observations and Findings

DESCRIPTION OF LOCATION

HTandT, the licensee, conducted radiography, at the IKEC Power Plant, of welds in a tank constructed by Fisher Tank. The tank is fabricated by welding preformed 3/8 inch thick concentric rings of Duplex®, a corrosion resistant, low magnetic material. The tank walls contained a permanently installed personnel access hatch, a temporary larger entrance for heavy equipment egress and various scaffolding brackets temporarily welded onto the interior surface of the tank.

On the evening of August 20, 2008, between 6:30 PM and 8:00 PM, HTandT radiographic personnel completed ten radiographic exposures of one minute and ten seconds each. The exposures were implemented using an Iridium-192 (Ir-192) sealed source (QSA Global Model A424-9, serial number 48578B) in a QSA Model 880 Sigma camera (serial number S1453, Sealed Source and Device Registration (SSDR) No. MA-1059-D-334-S). The source strength (gamma ray constant) without any shielding was approximately 500 mR/hr at one foot. This camera contained an Ir-192 sealed source with an activity of 3/4 the maximum source load (see SSDR for maximum source load).

The Fisher Tank foreman and a representative of the construction sub-contractor remained on site to monitor HTandT activity. The foreman and contractor stayed in their vehicle parked beyond the 2mR/hr boundary. In order to further limit access, the road closest to the tank was closed in both directions.

SET UP FOR ELEVENTH SHOT

At approximately 8:00 PM, the licensee was preparing for the eleventh shot. The lead radiographer hung the radiographic camera on a scaffold bracket approximately fifteen feet off the ground. The source collimator was attached to a magnetic chemistry stand and the stand was attached to the tank wall at approximately 24 feet off the ground above a wooden scaffold plank approximately 10-12 feet high off the ground. The distance between the crank assembly and the camera was 25½ feet allowing the crank assembly to be placed at ground level with the lead radiographer.

The second radiographer stayed outside the tank, surveying the 2mR/hr boundary, and ensuring no personnel entered the controlled area during the exposure. The lead radiographer stayed inside the tank, utilizing an automated man lift as additional shielding during the exposure. However, at about five seconds after exposing the source (i.e., cranking the source from the camera to the collimator), both radiographers heard a "thud" sound. The lead radiographer immediately went to the crank assembly and unsuccessfully attempted to return the Ir-192 source into the camera. A visual survey indicated the collimator had fallen from its position on the tank wall. The lead radiographer noted his survey meter was pegged on the times ten scale indicating a radiation field greater than 100 mR/hr. His alarming ratemeter started to chirp indicating a radiation field greater than 250 mR/hr. The lead radiographer cranked the source back into the collimator in order to limit the radiation field to the collimator cone.

FIRST ATTEMPT TO RETRIEVE SOURCE

The lead radiographer visually confirmed the guide tube was coiled in such a manner as to prevent the drive cable from retracting the source. The lead radiographer used a long pole to uncoil the guide tube, but the source would not retract. After this second attempt, the lead radiographer exited the tank, via the personnel hatch, and instructed the other radiographer to move the perimeter control boundaries an additional 60 feet from the equipment hatch doorway. The foreman and the contractor were notified and asked to move further away in their vehicle. They moved the vehicle another 40-50 feet and were approximately 110 feet from the tank; outside of the 2mR/hr boundary.

At approximately 8:30 PM, the lead radiographer called the RSO listed on the Kentucky license to request assistance. However, the Kentucky license does not authorize source retrievals; only the NRC license allows for the Corporate RSO to perform source retrievals. The Corporate RSO was not contacted to perform the source retrieval.

While waiting for the Kentucky RSO to arrive, the lead radiographer checked his pocket dosimeter. The pocket dosimeter read 190 millirem. Knowing that the pocket dosimeter range ends at 200 millirem, the lead radiographer re-zeroed his Arrow-Tech Model W138 pocket dosimeter.

The RSO picked up a twelve foot telescoping pole from his garage and stopped at the Kentucky office for his dosimetry (i.e., Arrow-Tech Model W138 pocket dosimeter, NDS Product Model RA-500 alarming ratemeter, and Landauer optically stimulated luminescence (OSL) whole body dosimeter), a new source guide tube, and additional lead shielding.

SOURCE RETRIEVAL OPERATIONS

It was approximately 10:00 PM, when the RSO arrived at IKEC Power Plant. The RSO and lead radiographer entered through the personnel access door and stood behind the JLG man lift to visually inspect the situation. At no time, did the RSO, lead radiographer or second radiographer read or review the Operating and Emergency Procedures which were in the dark room truck at the site.

The RSO and lead radiographer made several attempts to retract the source and during these attempts the lead radiographer used both his radiation survey meter and alarming rate dosimeter information to limit his stay times. They also returned to a low-dose area behind the man lift to assess the situation.

Once the camera and associated equipment were on ground level, the RSO placed additional lead shielding on top of the collimator. The RSO visually saw the crimp on the guide tube. The RSO tapped the guide tube at the crimped area with a hammer in an attempt to round the tube. After the second attempt, the lead radiographer successfully retracted the source back into the camera. The lead radiographer surveyed the camera and guide tube and locked the camera. The source was secured.

The lead radiographer's pocket dosimeter read 180 millirem. The RSO's pocket dosimeter was off-scale. The time was approximately 10:30 PM.

POST-EVENT ANALYSIS

The following day at the Kentucky Field Office, the two radiographers and the RSO from the Kentucky license discussed the event and wrote an incident report for their client, Fisher Tank. The RSO inspected the source guide tube and removed it from service. The RSO also took apart the crank assembly to determine if the drive cable was operational or sustained any damage due to the crimp in the source guide tube. Based on his review, the crank assembly was operational. The two radiographers and RSO turned in their OSL whole body dosimeters and were issued new ones.

On Friday August 22, 2008, the dosimeters were shipped via FedEx to Landauer for expedite analysis. The Office Manager from Kentucky attempted to notify the Chief Operating Officer of the event via electronic mail. However the Office Manager used an incorrect email address for the Corporate RSO. As of August 22, 2008, the Corporate RSO was unaware of the event.

On Monday, August 25, 2008, Landauer received the OSL dosimeters.

DOSIMETRY RESULTS AND COMPARISONS

At 9:30 AM on Friday, August 29, 2008, the Corporate RSO received a courtesy facsimile from Landauer. The Landauer report indicated that the lead radiographer received a whole body exposure of 404 mrem as summarized:

<u>PERSON</u>	<u>OSL READING (mrem)</u>	<u>POCKET DOSIMETER (mrem)</u>
Lead Radiographer	404	190 + 180 = 370
Radiographer	162	158
RSO	108	off-scale (>200)

The alarming ratemeters never sounded a solid alarm, which would have indicated exposures greater than 500 mR/hr. The readings above coincide with the alarming ratemeter information. The whole body exposures for the lead radiographer and radiographer are relatively close when comparing the OSL reading to the pocket dosimeter reading. But there appears to be an approximately 100 mrem difference with the RSO's readings. This difference was a likely result of the placement of the two dosimeters. The RSO wore his OSL whole body dosimeter at waist level, but had his pocket dosimeter in his shirt pocket. The RSO noted that standing behind the man lift would have given more shielding to the OSL whole body dosimeter. 10 CFR 34.47(a) requires radiographers to wear three types of dosimetry on the trunk of their body, but there is no requirement to wear all three dosimeters in one place on the trunk of the body. Between August 21 and 29, 2008, the RSO did not conduct industrial radiography until the Landauer exposure report was reviewed and determined that there was no over-exposure.

NOTIFICATION OF EVENT

The Corporate RSO, still uninformed about the event, contacted the Kentucky Office and asked for an explanation for the Landauer report. The Corporate RSO was informed of the event for the first time on August 29, 2008. The Corporate RSO requested a copy of the incident report and he requested that the regulatory agencies are notified.

After the subsequent three day holiday weekend, the Corporate RSO contacted the Kentucky office. On Tuesday, September 2, 2008, the Corporate RSO learned that the notifications had not been made. The Corporate RSO initiated the required notifications.

NOTIFICATION OF NRC

On Wednesday, September 3, 2008, the Corporate RSO notified the NRC Headquarters Operations Office (Event No. 44459). Then the Corporate RSO made arrangements to travel to Kentucky and perform his own investigation of the incident.

On September 9, 2008, the Corporate RSO provided the NRC with a written report about the incident. The licensee determined the root cause was that dirt collected on the magnetic base of the chemistry stand that was used to support the source collimator. This compromised the holding ability against the tank causing the stand to fall onto the source guide tube. The crimped source guide tube prevented retraction and securing of the sealed source assembly in the exposure device.

LICENSEE CORRECTIVE ACTIONS

All radiography personnel were advised of the root cause and were cautioned to always inspect and clean the magnetic base prior to placement for each independent exposure and to use additional reinforcement magnets as required to prevent the magnetic base from slipping during radiographic exposures.

The licensee submitted a license amendment request to Kentucky to replace the RSO with the Corporate RSO and update procedures.

Two personnel from the Kentucky office have been scheduled to receive training for Radiation Safety Program Administration, Maintenance and Source Retrieval.

New "Emergency Contact" signs were distributed for the Kentucky office to ensure that the Corporate RSO is notified of all events.

ON-SITE NRC INSPECTION AT KENTUCKY FIELD OFFICE

From September 10-12, 2008, a representative from NRC Region I Office and three representatives from the Kentucky Agreement State program performed a reactive safety inspection of this event. Based on the interviews with personnel involved in the event, observations of re-enactments, and a review of selective associated paperwork, it appeared that the magnetic chemistry stand base did not hold sufficiently to the tank wall and fell approximately 12-14 feet onto a wooden plank. The magnetic base and the collimator became detached and the magnetic base fell on top of the source guide tube and crimped the tube. This crimp in the source guide tube prevented the source from being retracted into the camera.

WRITTEN 30-DAY REPORT

On September 17, 2008, the Corporate RSO provided a written report of the event (ADAMS Accession No. ML082660042) and included all of the required information in accordance with 10 CFR 34.101.

c. Conclusions

The inspector interviewed the licensee staff involved in the event and determined that the staff had been trained on the operating and emergency procedures, but no one reviewed the operating and emergency procedures in response to this event. The radiographer failed to recognize the need to stop operations and consult the emergency procedures. By using a pole to untangle the source guide tube, the radiographer was no longer performing normal radiographic operations, and should have consulted the emergency procedures. By continuing and attempting to retrieve the source, which was stuck between a crimped source guide tube and the collimator, the radiographer received additional radiation exposure. In addition, the radiographer was not authorized, trained, or qualified to perform source retrievals.

The RSO from the Kentucky license had some on-the-job training for source retrievals, but never attended a formal retrieval training course and was not authorized on the license to perform source retrievals. His actions with respect to use of lead shielding and extended poles were consistent with the emergency procedure. The technique of using a hammer would have been the approach a trained and qualified source retrieval individual would have employed, with additional assistance. However, the individual should have read his dosimeter and ensured someone was monitoring the time associated with the entries to manage the exposure stay times and to assist in reconstruction of the dose, in accordance with the emergency procedures. Source retrieval operations usually consist of at least one person using a stop watch for each attempt, another person using a telescoping survey meter to record actual radiation dose rates, another person documenting the chain of events, and some personnel taking turns with each attempt. By taking turns, it limits the overall radiation exposure. However, for the source retrieval operations on August 20, 2008, this was not done.

The NRC determined that the root cause for the crimped guide tube can be attributed to an unstable set-up for the 5 ½ pound collimator/source guide tube extender. The licensee used a magnetic chemistry stand base on a duplex steel tank wall at 24 feet in the air that could not support the weight of the collimator/source guide tube and extender tubes. In addition, HTandT personnel failed to review the operating and emergency procedures, which provide initial actions to be taken in response to a crimped guide tube.

Based on the inspector's findings, there are three apparent violations of NRC requirements:

License Condition 17 of NRC License No 47-23076-01 states that the licensee is authorized to conduct source retrieval activities in accordance with the letter dated March 14, 2005. The letter provides the training for two individuals in the company who have been trained by the source and device manufacturer for source retrievals. At the present time, only one of these individuals still works for this company and he is the Corporate RSO. No other individual employed with this NRC licensee has been trained or authorized to perform source retrievals. Contrary to the above, on August 20, 2008, personnel not trained or authorized conducted source retrieval activities and shielded-down the source. The Corporate RSO should have been notified immediately, because the radiography was being conducted under the NRC license. However, the radiographic

personnel only notified the RSO in Kentucky and no one from the Kentucky Office notified the Corporate RSO until August 29, 2008. As such, the Corporate RSO learned of the event nine days after it occurred and the NRC was notified of the event two weeks after the event occurred. The failure to have trained, qualified, and approved personnel perform source retrieval operations is an apparent violation of License Condition 17.

10 CFR 30.50(b)(2)(i) requires, in part, that each licensee shall notify the NRC within 24 hours after an event in which equipment is disabled or fails to function as designed when the equipment is required by regulation to prevent exposures to radiation and radioactive materials exceeding regulatory limits. Contrary to the above, between August 20, 2008, and September 3, 2008, the licensee had an event where equipment (a source guide tube attached to a QSA Global Model 880 Sigma radiography camera) was disabled and the licensee did not notify the NRC until two weeks after the event. The radioactive source would have given a dose rate of approximately 500 mR/hr at one foot if unshielded. The failure to make the required 24-hour notification is an apparent violation of 10 CFR 30.50(b)(2)(i).

10 CFR 34.47(d) requires, in part, that if an individual's pocket chamber (also known as a pocket dosimeter or PD) is found to be off-scale, and the possibility of radiation exposure cannot be ruled out as the cause, the individual's personnel dosimeter must be sent for processing within 24 hours. Between August 20 and 22, 2008, the RSO's pocket chamber went off-scale due to the source retrieval event and the RSO's personnel dosimeter was not sent in for immediate analysis within 24 hours. The dosimeters were mailed on August 22, 2008. The failure to have dosimeters sent for processing within 24 hours is an apparent violation of 10 CFR 34.47(d).

III. Exit Meeting

On October 15, 2008, the inspector discussed the preliminary inspection findings by telephone with the Chief Operating Officer, Corporate RSO, and Field Operations Manager. On October 28, 2008, a final exit meeting was conducted by telephone with the inspector, the cognizant NRC branch chief, and the licensee's Corporate RSO.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

#*Donald J. Adkins, Corporate RSO and General Safety Manager 304-453-6111
Ken Rogers, Level III Radiographer and Kentucky Office Manager 502-964-0500
Brenda Rogers, executive administrative assistant for Kentucky Office
Noah S. Garrow, radiographer
Gary W. Elliott, radiographer
Charles A. Barnes, radiographer and RSO for Kentucky license
Tom Borders, scheduler for Kentucky field office
Perry Marone, IT specialist for Kentucky Office
*Mike Adkins, Field Operations Manager
*Steve Pratt, Chief Operating Officer

* participated in preliminary exit meeting on October 15, 2008

participated in final exit meeting on October 28, 2008

Agreement State Personnel

Brian Parsley, Radiation Health Specialist
Ricky Horky, Radiation Health Specialist
Curt Pendergrass, Radiation Health Specialist