



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PENNSYLVANIA 19406-1415

September 28, 2006

Docket No. 03035895
EA No. 06-214

License No. 37-30704-01

Edward L. Balsavage, P.E.
Managing Partner/Radiation Safety Officer
Advantage Engineering, LLC
910 Century Drive
Mechanicsburg, PA 17055

SUBJECT: INSPECTION 03035895/2006001, ADVANTAGE ENGINEERING, LLC, THE LICENSEE'S FACILITIES IN MECHANICSBURG AND ALLENTOWN, PENNSYLVANIA, AND THE TEMPORARY JOB SITES IN ABINGTON, NORTHAMPTON, AND BETHLEHEM, PENNSYLVANIA

Dear Mr. Balsavage:

This refers to the inspection conducted on July 1, 3, and 5, 2006, at your facilities in Mechanicsburg and Allentown, Pennsylvania, and at the temporary job sites in Abington, Northampton, and Bethlehem, Pennsylvania. The purpose of the inspection was to review the circumstances surrounding the event that occurred on July 1, 2006, at your temporary job site in Abington (Event No. 42686, NMED Item No. 060430). A Troxler Model 3411 was damaged when it was left unattended at the site. The inspection also included a review of your radiation safety program and activities conducted under the above listed NRC license. The inspectors discussed preliminary findings of the inspection with you and members of your staff on August 10, 2006, and they are described in the enclosed Inspection Report (03035895/2006001).

The inspection identified ten apparent violations of NRC requirements, including, failure to control and maintain constant surveillance of licensed material that is in a controlled or unrestricted area, as required by 10 CFR 20.1802. This violation meets the criteria for a Severity Level III violation as described in General Statement of Policy and Procedure for NRC Enforcement Actions (Enforcement Policy), Supplement IV.C.11. In accordance with the Enforcement Policy the NRC is considering escalated enforcement action against Advantage Engineering, LLC.

On September 18, 2006, during her telephone conversation with you, Judith Joustra of my staff explained to you the inspection findings and the significance of the apparent violations and that the NRC has sufficient information regarding the violations and your corrective actions, to make a final decision on an appropriate enforcement action. Ms. Joustra also explained to you the options available to the NRC for enforcement actions and provided you with an opportunity to attend a Predecisional Enforcement Conference to provide the NRC with additional information before the NRC makes a final enforcement decision. You declined the opportunity to attend the Conference and stated that you had no additional information to provide to the NRC.

You are not required to respond to this letter. You will be notified of our final enforcement action after completion of our review.

Current NRC regulations are included on the NRC's website at www.nrc.gov; select **Nuclear Materials; Medical, industrial, and academic uses of nuclear material**; then **toolkit index page**. The current NRC Enforcement Policy is included on the NRC's website at www.nrc.gov; select **What We Do, Enforcement**, then **Enforcement Policy**. Or you may obtain these documents by contacting the Government Printing Office (GPO) toll-free at 1-888-293-6498. The GPO is open from 7:00 a.m. to 8:00 p.m. EST, Monday through Friday (except Federal holidays). To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be placed in the PDR without redaction.

Sincerely,

Original signed by Michael Layton

George Pangburn, Director
Division of Nuclear Materials Safety

Enclosure:
Inspection Report No. 03035895/2006001

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EXECUTIVE SUMMARY

Advanced Engineering, LLC
NRC Inspection Report No. 03035895/2006001

The licensee notified the NRC Operations Center (Event No. 42686) on July 1, 2006, that a Troxler Model 3411 portable gauge was run over by a bulldozer at its temporary job site located in Abington Township, Pennsylvania. The event occurred on July 1, 2006, when an authorized user (AU) left the gauge unattended at the site. Region I conducted a special inspection on July 1, 2006, at the site to review the circumstances surrounding the event.

The AU after making his last measurement of the day, left the gauge unattended at the site and went to retrieve his vehicle that was parked several hundred feet away. While the gauge was left unattended by the AU, it was damaged by a bulldozer that was operating at the site. The AU notified his supervisor of the event.

Upon arrival at the site, the inspector noted that the AU and his vehicle were more than 200 feet away from the damaged gauge and the damaged gauge was not visible from this location. Personnel from the local police, the fire department and the County HAZMAT Division were also present at the site. Prior to the inspector's arrival the County HAZMAT personnel had surveyed the damaged gauge and the surrounding areas and their measurements indicated that the dose rates at the surface of the gauge were approximately 3 milliroentgen/hour (mR/hr). However, the surveys of area performed later in the inspector's presence indicated dose rates as high as 50 mR/hr near the detached source rod.

The gauge was a Troxler Electronic Laboratories Model 3411 portable gauge and contained a 38.8 millicurie sealed source of americium 241 (Am-241), and a 5.4 millicurie sealed source of cesium 137 (Cs-137).

On July 3, 2006, and July 5, 2006, Region I conducted inspections of licensee's activities at two other temporary job sites of the licensee and the two authorized storage locations listed on the license.

These inspections identified the following ten violations of NRC requirements:

- (1) Failure to control and maintain constant surveillance of licensed material that was in an unrestricted area and not in storage (10 CFR 20.1802);
- (2) Failure to conduct operations so that dose in an unrestricted area does not exceed 0.002 rem in any one hour (10 CFR 20.1301(a)(2));
- (3) Failure to secure shipment to prevent shifting during normal transportation conditions (49 CFR 173.448);
- (4) Failure to include correct identification number in shipping papers (49 CFR 172.202(a)(3));
- (5) Failure to periodically (at least annually) review the radiation protection program content and implementation (10 CFR 20.1101(c));
- (6) Failure to submit a written follow-up report within 30 days of the initial report (10 CFR 30.50(c)(2));

- (7) Failure to provide and document recurrent training for hazmat employees at least once every three years (49 CFR 172.704(c)(2));
- (8) Failure to implement and maintain the operating and emergency procedures in Appendix H of NUREG-1556, Vol. 1, Rev. 1, dated November 2001, and provide copies of these procedures to all gauge users and at each job site (License Condition 20);
- (9) Failure to conduct a physical inventory of sources and/or devices received and possessed under the license every six months (License Condition 15); and
- (10) Failure to possess and use, or have access and use, a radiation survey meter that meets the Criteria in the section entitled "Radiation Safety Program - Instruments" in NUREG-1556, Vol. 1, Rev. 1, dated November 2001 (License Condition 20).

REPORT DETAILS

I. Organization and Scope of the Program

a. Inspection Scope

The inspection included a review of licensee's organizational structure and scope of licensed activities.

b. Observations and Findings

The licensee is an engineering company and maintains NRC License No. 37-30704-01 that authorizes use of portable nuclear moisture/density gauges at temporary job sites within NRC jurisdiction. The license authorizes storage of gauges at the licensee's facilities located in Mechanicsburg, and Allentown, Pennsylvania. The managing partner of the licensee is also the Corporate Radiation Safety Officer (RSO). The licensee possesses 21 portable gauges and there are more than 30 authorized users (AU).

c. Conclusions

The inspection did not identify any violations or safety concerns.

II. Notification of the Event

a. Inspection Scope

The inspection included a review of the notification of the event (Operations Center Event No. 42686) and the required 30 day report (10 CFR 30.50(b)(2)).

b. Observations and Findings

On July 1, 2006, the licensee made the following notification to the NRC Operations Center:

"A Troxler Model 3411 moisture density gauge was damaged when it was run over by a bulldozer at the Rydal-Waters construction site on Brooke Road in Abington Township, Montgomery County, PA. The gauge was left unattended and uncontrolled while the gauge operator went to retrieve a vehicle to transport the gauge. While left unattended, the gauge was run over by a bulldozer resulting in the gauge being broken and the instrument case being damaged. The sources remained in place in their rods. The rods were placed back inside the gauge, and the gauge was placed back inside its case. Soil surveys resulted in no spread of contamination. Radiation levels taken were not abnormal. There are two sealed sources inside the gauge Cs-137, serial number 40-8387, 5.4 millicuries and Am-241/Be, serial number 47-6341, 38.8 millicuries."

c. Conclusions

The licensee made a timely report of the event to the NRC Operations Center (Event No. 42686) on July 1, 2006, in accordance with 10 CFR 30.50(b). 10 CFR 30.50(c)(2) requires that the licensee submit a written follow-up report of the event within 30 days of the initial report. The licensee submitted the written follow-up report of the event on August 12, 2006, after a period of more than 30 days.

Failure to submit a written report within 30 days of the initial report is an apparent violation of 10 CFR 30.50(c)(2).

III. Follow-up of the Event by NRC

a. Inspection Scope

The inspection included a review of the circumstances surrounding the event and review of licensee's procedures for transportation and maintaining security of licensed material at temporary job sites.

b. Observations and Findings

On July 1, 2006, NRC inspector responded to the event that had occurred earlier the same day at the licensee's temporary job site in Abington, Pennsylvania. Upon his arrival at the site, the inspector noted that the AU was waiting near his vehicle that was parked in a parking area at the site. Abington Police, Fire Marshal, and Montgomery County Hazardous Material (MCHM) Bureau representatives were also present in the parking area. The damaged gauge was not visible from the parking area, and the AU accompanied the inspector to the gauge that was more than 200 feet away from the parking area. The inspector noted that access to the area where the damaged gauge was left, in an open field, was not restricted and there were no boundaries established around the damaged gauge to limit access to the gauge by members of the public.

The AU stated that he took his last measurement of the day at approximately 2:30 p.m. and went to bring his vehicle from the parking lot, leaving the gauge unattended near the spot where he had taken his last measurement. While he was going to get his vehicle, a bulldozer working at the site ran over the gauge and damaged the gauge. The AU acknowledged that while going to the parking area, his back was towards the gauge and he did not see the bulldozer coming towards the gauge nor did he see the gauge being damaged by the bulldozer.

10 CFR 20.1802 requires that the licensee control and maintain constant surveillance of the licensed material that is in a controlled or unrestricted area and that is not in storage.

The inspector verified that the damaged gauge was a Troxler Electronic Laboratories Model 3411 (Serial No. 10942), and a part of its cast aluminum casing was crushed. The inspector noted that the index rod of the gauge was broken and part of the index rod and the source rod had become detached from the gauge and were lying near the gauge. The source rod

did not appear to have been damaged. The AU did not have a survey meter and the MCHM personnel performed radiological surveys of the gauge and the surrounding areas. The results of these initial surveys indicated that the Am-241 source was still located in the gauge, but the low dose rates (approximately 3 mR/hr) near the surface of the gauge indicated that the Cs-137 source was no longer inside the gauge. The inspector requested the MCHM personnel to survey the gauge and its surroundings again. These surveys indicated that dose rates as high as 50 mR/hr existed near the detached source rod. These surveys confirmed that the Cs-137 source was still attached to the source rod that had been separated from the gauge. The dose rates at approximately 1 foot from the source rod were as high as 3 mR/hr, and these dose rates existed for several hours in the unrestricted area surrounding the damaged gauge. The MCHM personnel made these surveys using a NJSP Model CDV 700 (Serial No. 04841) that was last calibrated on July 10, 2003. The MCHM personnel stated that the instrument is calibrated every four years and is due for calibration in July 2007.

10 CFR 20.1301(a)(2) requires, in part, that each licensee conduct operations so that the dose in any unrestricted area from external sources does not exceed 0.002 rem (2 mrem) in any one hour.

The event occurred near the end of the day when most of the workers had left the area near the damaged gauge. Therefore it was unlikely that members of the public came into contact with the radioactive material or received any significant radiation dose.

Upon learning of the damage to the gauge, the AU contacted his supervisor at the licensee's Allentown facility, who arrived at the site at approximately 8:30 p.m. The RSO was not available and the licensee's director of Geotechnical Services notified the NRC Operations Center of the event. The supervisor contacted Troxler Electronics Laboratories for assistance, and with guidance from Troxler Electronics Laboratories representative, the supervisor was able to reinsert the source rod back into the gauge.

The supervisor placed the damaged gauge in its transport container for transport back to its storage location in Allentown. The inspector noted that neither the AU nor the supervisor had any means to secure the transport container from shifting while transporting the gauge in their vehicles. The AU stated that he always transported the gauge in the back seat of his vehicle. The inspector reminded the supervisor and the AU of the DOT requirement that shipment of radioactive material be secured to prevent shifting during normal transportation conditions.

49 CFR 173.448 requires that each shipment of hazardous material be secured to prevent shifting during normal transportation conditions. Pursuant to 49 CFR 173.2 and 49 CFR 173.403 radioactive material is hazardous material.

The supervisor, with assistance from the Fire Marshal was able to secure the container in the AU's vehicle and the damaged gauge was removed from the job site. The MCHM personnel performed radiological surveys of the area after the gauge had been removed and noticed that the radiation dose rates in the area were at background levels.

The inspector reviewed the documents that the AU carried with him and noted that the documents did not include a copy of the licensee's operating and emergency procedures.

Condition 20 of the License requires, in part, that the licensee provide copies of the operating and emergency procedures to all gauge users and at each job site, as described in Appendix H of NUREG 1556, Volume 1, dated May 1997.

The Bill of Lading carried by the AU had the identification number UN2974, which is not the correct identification number of the radioactive material he was transporting. The correct identification number is UN3332 as specified in 49 CFR 172.101.

49 CFR 172.202(a)(3) requires that the shipping papers include the identification number of the material as specified in 49 CFR 172.101.

c. Conclusions

The inspection identified five violations of NRC requirements: (1) Failure to control and maintain constant surveillance of licensed material that is in controlled or unrestricted area (10 CFR 1802); (2) Failure to conduct operations so that dose in an unrestricted area does not exceed 0.002 rem in any one hour (10 CFR 20.1301(a)(2)); (3) Failure to secure each shipment of radioactive material to prevent shifting during normal transportation conditions (49 CFR 173.448); (4) Failure to include correct identification number in the transportation documents (49 CFR 172.202(a)(3)); and (5) Failure to provide copies of operating and emergency procedures to gauge user at each job site (License Condition 20).

IV. Inspection of Radiation Protection Program

a. Inspection Scope

The inspection included a review of the licensee's overall radiation safety program including training of AUs, visits to storage facilities located in Allentown and Mechanicsburg, and temporary job sites in Bethlehem and Northampton, Pennsylvania, and interviews with personnel.

b. Observations and Findings

On July 3, 2006, an inspector visited the licensee's temporary job sites in Northampton and Bethlehem, Pennsylvania. The AUs had transported the gauges to these job sites in their personal vehicles. The AUs at these sites did not have in their possession all of the documents that are required by the NRC and the DOT regulations. The AU at the Bethlehem site only had the Bill of Lading, and neither of the two AUs had a copy of the licensee's operating and emergency procedures.

As described in Section III above, Condition 20 of the license requires that the licensee provide copies of the procedures described in Appendix H of NUREG 1556, Volume 1, dated May 1997.

The inspector noted that in order to take measurement, the AU at the Northampton site first extended the source and then visually aligned the source rod with the hole in the ground. This practice had the potential of causing unnecessary exposure of the worker and members of the public to radiation. A review of the licensee's records of personal monitoring indicated that during the first quarter of 2006, this AU received a radiation dose of 105 mrem which was higher than the doses received by most other AUs of the licensee. However, his radiation dose did not exceed the regulatory limit. The RSO was unable to explain why this individual received radiation doses that were higher than other AUs. The inspector was concerned that the procedure used by this AU to align the source to the hole in the ground did not achieve occupational doses as low as is reasonably achievable (ALARA). The inspector noted that the AU at the Bethlehem site used the appropriate procedure to align the source.

On July 5, 2006, the inspector visited the licensee's facilities in Allentown, and Mechanicsburg, and reviewed licensee's storage facilities and a selected sample of representative records. The inspector noted that the gauges at these facilities were stored in a locked cabinet that was located in a locked room.

The licensee possessed only one radiation survey instrument that was maintained at the Mechanicsburg facility. The AUs at the temporary job sites also stated that a survey instrument was available from their facility in Mechanicsburg for emergencies. However, the inspector noted that the survey meter at the Mechanicsburg facility was not operational. The instrument did not have batteries and there was no record to demonstrate that it had been calibrated. The licensee did not have any other radiation survey meter.

Condition 20 of the license requires, in part, that the licensee possess and use, or have access to and use a radiation survey meter that meets the Criteria in section entitled "Radiation Safety Program - Instruments" in NUREG 1556, Volume 1, dated May 1997, in the event of an incident.

The licensee maintained records of leak tests for each portable gauge, and the records indicated that the gauges were being leak tested at the required intervals of six months. The licensee's records also included use logs for the portable gauges. The licensee did not have record of physical inventory of the portable gauges possessed under the license. The licensee stated that regular inventories have not been conducted and instead the use logs of the portable gauges is considered an indication that all portable gauges are present. The inspector noted that the portable gauges are frequently transferred from one facility to the other and the use logs of each portable gauge moves with the gauge. The licensee did not maintain any records of these transfers.

Condition 15 of the license requires, in part, that the licensee conduct physical inventory every six months, to account for all devices received and possessed under the license, and maintain records of inventories for five years from the date of each inventory.

The licensee provides personal monitoring devices to all of its AUs. The devices are exchanged each quarter and are processed by a NVLAP contractor. Review of records of radiation doses received by the personnel indicated that all doses were within the regulatory limits. However, the records indicated that one individual consistently received higher

radiation doses than others. The licensee stated the individual's procedures of using the gauges will be reviewed. The licensee did not have records of annual reviews of its radiation protection program. The licensee stated that the reviews had not been conducted.

10 CFR 20.1101(c) requires that the licensee periodically (at least annually) review the radiation protection program content and implementation.

The licensee uses a third party to provide radiation safety training to its workers. The inspector noted that each of the users had a training certificate indicating that each had received initial radiation safety training, including the hazmat training required by the DOT regulations. A few of these certificates were dated more than three years ago. The licensee had no documentation to demonstrate that these workers had received the recurrent hazmat training.

49 CFR 172.704(c)(2) requires that a hazmat employee receive the training required by subpart H of 49 CFR part 172 at least once every three years, and 49 CFR 172.704(d) requires, in part, that a record of current training be created and retained by each hazmat employer for as long as that employee is employed by the employer.

c. Conclusions

The inspection identified the following five violations: (1) Failure to periodically (at least annually) review the radiation protection program content and implementation as required by 10 CFR 20.1101(c); (2) Failure to conduct physical inventories every six months as required by Condition 15 of the License; (3) Failure to provide recurrent hazmat at least once every three years as required by 49 CFR 172.704(c)(2); (4) Failure to possess and use, or have access to and use a radiation survey meter that meets the Criteria in section entitled "Radiation Safety Program - Instruments" in NUREG 1556, Volume 1, dated May 1997, in the event of an incident; and (5) Failure to provide copies of operating and emergency procedures to gauge user at each job site (License Condition 20). In addition, the inspection also identified a safety concern that the procedure used by an AU to align the source with the hole in the ground did not achieve occupational doses as low as is reasonably achievable (ALARA).

V. Transportation

a. Inspection Scope

The inspection reviewed licensee's procedures for transport of gauges to temporary job sites.

b. Observations and Findings

The AUs transport the gauges to temporary job sites in their personal vehicles. The licensee stated that AUs are required to transport the gauges in the trunk of their vehicles, and are required to secure the gauge containers to prevent shifting during transport. If the gauges are transported in open bed pick up trucks, the gauges are secured by two chains and are secured in the vehicle to prevent shifting during transport. The inspector observed that the two AUs at the two temporary job sites he visited had the gauges locked in the trunks of their vehicles. The two AUs appeared to be familiar with the regulatory requirements related to transport of licensed material.

c. Conclusions

The inspection did not identify violations other than those described in Sections III and IV above.

VI. Exit Meeting

The inspectors met with the licensee's management on August 10, 2006, to discuss the findings of the inspection. The inspector described the violations identified during the inspection and stated that these findings are preliminary and the NRC management will make a final determination of the violations. The inspector explained the NRC enforcement policy.

The licensee stated that they are committed to comply fully with the regulatory requirements and described the corrective actions that have been implemented by the licensee to prevent recurrence of the violations. These actions included: memo to all supervisors informing them of the event that resulted in the gauge being damaged, training of AUs emphasizing the importance of security of licensed material at job sites, purchase of three new radiation monitors, and review of radiation safety procedures.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

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D. Schauble, Director of Geotechnical Services
J. Kuna, Authorized User
D. McGovern, Authorized User
T. Gunderman, Authorized User
D. Kreicher, Authorized User