



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
REGION IV  
1600 E. LAMAR BLVD.  
ARLINGTON, TX 76011-4511

May 3, 2018

Lt. General Kenneth R. Dahl, Commander  
U.S. Army Installation Management Command  
2405 Gun Shed Road  
Joint Base Fort Sam Houston, TX 78234-1223

SUBJECT: FORT HOOD - NRC INSPECTION REPORT 040-09083/2018-001

Dear Lt. General Dahl:

This letter refers to the U.S. Nuclear Regulatory Commission (NRC) inspection conducted on April 3, 2018, at Fort Hood located in Killeen, Texas. The NRC inspectors discussed the results of this inspection with the Radiation Safety Officer identified under your license, the Garrison Radiation Safety Officer, and the Deputy Commander, U.S. Army Garrison (USAG), Fort Hood, at the final exit briefing on April 3, 2018. The inspection results are documented in the enclosure to this letter.

This inspection was an examination of activities conducted under your NRC Source Materials License SUC-1593 as it relates to public health and safety, common defense and security, and to confirm compliance with the Commission's rules and regulations and with the conditions of your license. Within these areas, the inspection consisted of selected examination of procedures and representative records, observations of activities, and interviews with personnel regarding programmatic implementation of the radiation safety plan, physical security plan, and the environmental radiation monitoring plan. No violations were identified and no response to this letter is required.

In accordance with 10 CFR 2.390 of the NRC's "Agency Rules of Practice and Procedure," a copy of this letter, its enclosure, and your response, if you choose to provide one, will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

K. Dahl

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Should you have any questions concerning this inspection, please contact Ms. Rachel Browder, Sr. Health Physicist, at 817-200-1452 or the undersigned at 817-200-1191.

Sincerely,

/RA/

Ray L. Kellar, P.E., Chief  
Fuel Cycle and Decommissioning Branch  
Division of Nuclear Materials Safety

Docket: 040-09083

License: SUC-1593

Enclosure:

Inspection Report 040-09083/2018-001

w/Attachment: Supplemental Information

cc w/encl:

U.S. Army Installation Management Command  
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IMSO/301

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**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION IV**

Docket No. 04009083

License No. SUC-1593

Report No. 04009083/2018-001

Licensee: United States Army Installation Management Command

Facility: Fort Hood

Location: Killeen, Texas

Dates: April 3, 2018

Inspectors: Rachel S. Browder, CHP, Senior Health Physicist  
Fuel Cycle and Decommissioning Branch  
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Region IV

Austin C. Roberts, Health Physicist  
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Accompanied By: Mark C. Roberts, CHP, Senior Health Physicist  
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Katherine R. Warner, Health Physicist  
Division of Nuclear Materials Safety  
Region I

Approved By: Ray L. Kellar, P.E., Chief  
Fuel Cycle and Decommissioning Branch  
Division of Nuclear Materials Safety

Enclosure

## **EXECUTIVE SUMMARY**

United States Army Installation Management Command  
Fort Hood

NRC Inspection Report 04009083/2018-001

This U.S. Nuclear Regulatory Commission (NRC) inspection was a routine, announced inspection of activities authorized at the Fort Hood Installation, Killeen, Texas by NRC Source Materials License SUC-1593, Amendment 02, dated February 9, 2017. In summary, the licensee was conducting licensed activities in accordance with approved procedures, license requirements, and applicable NRC regulations.

### **Industrial/Academic/Research Programs**

- The licensee implemented all aspects of its program, including the radiation safety plan, physical security plan, and the environmental radiation monitoring plan. The radiation safety program was in compliance with license requirements. The licensee implemented all aspects of its physical security plan. As a result, the licensee was effectively controlling the security of the depleted uranium (DU) on the training range. In addition, the licensee was monitoring the environment and did not identify any migration of the DU from the radiation controlled area. (Section 1.2)

## Report Details

### Summary Status of Licensed Activities

During August 2005, the Department of the Army discovered remnants of munitions containing depleted uranium (DU) at the Schofield Army Barracks in Hawaii, during an unexploded ordnance clearance project. The DU source material is the by-product that remains after natural uranium ore has been processed for use in nuclear reactors, such that the uranium-235 isotope is less than 0.711 weight percent of the total uranium present. The remnants were identified as spotting rounds that were used with the Davy Crockett Weapons System. The Davy Crockett Weapons System was either an M388 or M390 nuclear projectile developed during the late 1950's and deployed between 1962 and 1968. The weapons system was never used by the military, except during two test explosions in 1962, in a controlled environment at the Nevada Test Site.

The spotting round cartridge (M101) contained DU and was designed to mimic the trajectory of the nuclear projectile due to its density of approximately 18.8 grams per cubic centimeter ( $\text{g/cm}^3$ ), and was used to insure a high probability of impact by the weapons system. The spotting round emitted a puff of white smoke upon impact that allowed the officer in charge to figure the angle and timing calculations for the nuclear projectile. The DU remained intact or mostly intact on or near the surface following impact and did not explode. There were approximately 75,000 DU spotting rounds manufactured and subsequently distributed under the authority of a number of U.S. Atomic Energy Commission licenses that were in effect at the time. There were approximately 30,000 of the spotting rounds fired at Army ranges across the United States. Remnants of the tail assemblies may remain at each installation where the U.S. Army trained with the Davy Crockett weapon system from 1960 to 1968.

As a result of the discovery of the Davy Crockett spotting rounds in Hawaii, the Army conducted a historical review to collect and analyze information regarding the locations of use for the M101 spotting rounds at Army installations. The U.S. Army Installation Management Command (IMCOM) applied for a NRC license in 2008 on behalf of the Army for all identified locations that were under NRC jurisdiction. On October 13, 2013, the NRC issued source Material License SUC-1593 (docket number 040-09083) for the two locations in Hawaii for possession of DU. A subsequent amendment authorized other locations for possession of DU, so that a total of 16 installations were identified on the license, which represented multiple ranges and a total possession limit of 5700 kilograms of DU. The 20-millimeter spotting round weighed approximately one pound and contained about 0.45 pounds (0.204 kilograms) of DU. The licensee submitted environmental monitoring plans for each installation identified on the license as required by license Amendment Number 01. On February 9, 2017, the NRC authorized the environmental monitoring plans for each installation and incorporated them by reference under License Condition 11, and specified in part, under License Condition 18, that the licensee was required to implement the environmental monitoring plan at each installation by August 9, 2017.

As a result of these changes, the NRC initiated its inspection program of the licensee under NRC Inspection Manual Chapter 2800, starting in fiscal year 2018. Inspection Manual Chapter 2800, Section 07.04.b.1, states in part, that if the license authorizes licensed activities from more than 10 permanent facilities, then about 20 percent of the locations should be inspected during the inspection cycle. The inspection frequency for this license is every 2 years, based on the program code assignment of 11800, "source material - possession only." Therefore, based on the current number of facilities authorized, approximately 4 installations should be inspected during the current inspection cycle.

## **1 Industrial/Academic/Research Programs (87126)**

### **1.1 Inspection Scope**

The inspectors evaluated whether licensed activities were being conducted to protect public health and safety, the common defense and security, and with the conditions of the license and regulatory requirements.

### **1.2 Observations and Findings**

The license is managed under IMCOM, Fort Sam Houston, Texas, with one point of contact. The inspectors observed that the individual assigned as the point of contact was involved with the license application process, knowledgeable about the history and use of the DU spotting rounds and weapon systems, and was well-informed of the status of the activities conducted under the license at Fort Hood, Killeen, Texas. The individual coordinated with each location (i.e., installation) authorized under the license through the respective Garrison Radiation Safety Officer (RSO) at each installation.

The point of contact for the licensee explained that he visited each installation annually and performed an annual audit at each installation using Inspection Procedure (IP) 87126, which met the requirement of 10 CFR 20.1101, "Radiation Protection Programs." Based on the inspector's review of several annual audits performed across the installations, the inspectors concluded that the individual visited each installation and was familiar with the activities being conducted under the license. The licensee summarized lessons learned and made the results available to the Garrison RSOs.

#### **a. Implementation of the Radiation Safety Plan**

The Radiation Safety Plan, dated December 31, 2015 (ADAMS Accession Number ML16004A369) was submitted and authorized by the NRC under License Condition 11. There had been only one Garrison Radiation Safety Officer (RSO) assigned at Fort Hood since the installation was added to the license. The inspectors reviewed the training records for the Garrison RSO and concluded that he was qualified in accordance with the Radiation Safety Plan, Section 2.4.1, and had maintained his annual requalification training.

The inspectors observed that the licensed radiation controlled area for the DU spotting rounds was depicted as a highlighted area on the electronic range control map, which was used to authorize, monitor, and track live-fire training exercises on the range. Once approval had been granted through the range safety plan, the licensee drove the inspectors to the radiation controlled area that was established for the control of the DU on the range. There was only one side of the controlled area that was accessible, because the other three sides were interior to the range-controlled area and were inaccessible. The inspectors observed the required postings that indicated "Caution – Radioactive Material" signs, as required by Section 14.1 of the Radiation Safety Plan. The licensee explained there was no other DU stored at the Fort Hood installation, so no other cautionary signs were required.

The inspectors also observed other NRC required postings, including the NRC Form 3 and the applicable regulations, in locations as specified in the radiation safety plan. The inspectors observed the forms at the safety office and range control office bulletin board.

Since the Fort Hood location was added to the license as a location of use, there hasn't been any entries made into the radiation controlled area of the range. The area continues to be used for standard marksmanship and weapons familiarization training to support the mission of the installation, as authorized by the license and the radiation safety plan. The licensee had not entered the area for any other authorized range activity purposes. The inspectors observed a few cattle on the training range and the licensee confirmed that the installation had a grass lease allowing the cattle to graze on the training range. The NRC regional office was aware of the grass lease and confirmed that the cattle do not impact the conservative modeling of annual dose-rate calculations using the RESRAD-ONSITE, Version 7.2, computer code (RESRAD), that supports the license conditions.

The licensee maintained calibrated instruments as required by Section 17 of the Radiation Safety Plan. The instruments were calibrated annually as required by the standard operating procedure, "Instrument Use, Maintenance, and Calibration," dated November 14, 2016, by the Army's calibration facility at White Sands. The instruments available to the Garrison RSO were appropriate for the licensed material and type of uses anticipated under the possession-only license. The Garrison RSO explained that there was a spreadsheet available to calculate the minimum detectable concentrations, as necessary, although there had not been an opportunity to perform the activity since no one had entered the DU range controlled area.

b. Review of Physical Security Plan

The Physical Security Plan, dated December 31, 2015, is required by License Condition 11, and referenced in part, the publicly available access control documents to Army installations and ranges, including AR 190-16, "Physical Security," May 31, 1991, and AR 385-63, "Range Safety," January 30, 2012. The physical security plan referenced the Radiation Safety Plan for specific details regarding the control of the radiological boundaries, posting of the boundaries, controlling access to the radiation controlled area, and training of workers entering the area. These restrictions were necessary to control the security of the radioactive material within the training ranges.

During the inspection, the inspectors observed that the physical requirements and access control measures to the range were implemented through the installation range control officer. The inspectors were approved for entry onto the range area and were escorted by the range officer, although not onto the licensed, radiation controlled area. The inspectors were controlled and monitored during access to the range and were cleared from the range once they exited the area. Since no one entered into the licensed, radiation controlled area since the installation was added to the license, the inspectors did not have any records to review for this area of the inspection.

c. Implementation of the Environmental Radiation Monitoring Plan

The licensee developed a site-specific environmental radiation monitoring plan for each installation authorized on the license and each site-specific plan was approved by the NRC under license Amendment Number 02. The environmental radiation monitoring plan described the physical, geological, groundwater, and habitat of the installation.

The NRC approved plan for Fort Hood required quarterly sampling at two locations identified as ERM-01 and ERM-02. The locations were considered downstream of the radiation controlled area and the licensee collected surface water and sediment samples at each location on a quarterly basis. The licensee had a contract with Science Applications International Corporation (SAIC) for environmental sample collection and a contract with Test America for the analyses. It was raining at the time of the inspection, and the inspectors observed that the surface water from the range flowed towards the two sampling locations, as described in the environmental radiation monitoring plan.

The inspectors reviewed the quarterly sample results for the two designated locations at Fort Hood that were dated June 7, 2017, August 16, 2017, and December 5, 2017. The sample results did not identify the presence of DU, by means of the activity ratio of Uranium-238/Uranium-234 exceeding the value of 3, as specified in License Condition 17. The sample results did not indicate the presence of any radioactive materials above background levels.

1.3 Conclusion

The licensee implemented all aspects of its program, including the radiation safety plan, physical security plan, and the environmental radiation monitoring plan. The radiation safety program was in compliance with license requirements. The licensee implemented all aspects of its physical security plan. As a result, the licensee was effectively controlling the security of the DU on the training range. In addition, the licensee was monitoring the environment and did not identify any migration of the DU from the radiation controlled area.

**2 Unresolved Item**

The NRC performed an inspection at Fort Hood on May 25-27, 2007, under the NRC Inspection Report 040-08767/2007-001 (ADAMS Accession Number ML071900354) dated July 9, 2007. The inspection report documented an unresolved item involving the question of whether the DU material on the training range from the Davy Crockett weapons system should be authorized under an Army license or if the amount of material at Fort Hood could be possessed under a general license. It was determined by the NRC that the DU material should be specifically licensed and the DU material at Fort Hood was subsequently authorized under the NRC Source Materials License SUC-1593. Therefore, this unresolved item is closed.

**3 Exit Meeting Summary**

On April 3, 2018, the NRC inspectors presented the inspection results to Dr. Robert N. Cherry of your staff, and members of the U.S. Army Garrison (USAG), Fort Hood. No proprietary information was identified during the inspection.



**SUPPLEMENTAL INSPECTION INFORMATION**

**KEY POINTS OF CONTACT**

Licensee Personnel

R.Cherry, License RSO  
S.Bodkin, Garrison RSO

**INSPECTION PROCEDURES USED**

IP 87126      Industrial/Academic/Research Programs

**LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED**

Opened

None

Closed

040-08767/0701-01    URI      Determine whether the Army needs a site-specific license for possession of DU at Fort Hood

Discussed

None

## LIST OF ACRONYMS

ADAMS	Agencywide Documents Access and Management System
CFR	<i>Code of Federal Regulations</i>
DU	Depleted Uranium
IMCOM	Installation Management Command
NRC	Nuclear Regulatory Commission
RSO	Radiation Safety Officer
USAG	U.S. Army Garrison

FORT HOOD - NRC INSPECTION REPORT 040-09083/2018-001 - DATED May 3, 2018

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ADAMS ACCESSION NUMBER: ML18121A079

<input checked="" type="checkbox"/> SUNSI Review	ADAMS:	<input type="checkbox"/> Sensitive	<input type="checkbox"/> Non-Publicly Available	Keyword
By: RSB	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Non-Sensitive	<input checked="" type="checkbox"/> Publicly Available	NRC-002
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