



DEPARTMENT OF THE ARMY  
HEADQUARTERS, U.S. ARMY JOINT MUNITIONS COMMAND  
1 ROCK ISLAND ARSENAL  
ROCK ISLAND, IL 61299-6000

REPLY TO  
ATTENTION OF:

April 17, 2013

Safety/Rad Waste Directorate

Patricia Pelke  
Chief, Materials Licensing Branch  
US Nuclear Regulatory Commission, Region III  
2443 Warrenville Road, Suite 210  
Lisle, Illinois 60532-4352

Ms. Pelke,

We request amendment of our SUC-1380 license and have attached two updated sections of the license application for your review and approval. The updated sections are Supplement 2 and Supplement 5 and correspond to items 6 and 10 of Nuclear Regulatory Commission Form 313. We request the supplements attached here replace those currently in the license application. We base our request on the experience we have gained in the disassembly of ammunition items with depleted uranium components.

Please direct questions or comments to Mr. Kelly Crooks, (309) 782-0338, or Mr. Gary Buckrop, (309) 782-2969, electronic mail address: [usarmy.RIA.jmc.mbx.amsjm-sf@mail.mil](mailto:usarmy.RIA.jmc.mbx.amsjm-sf@mail.mil)

Sincerely,

Timothy J. Gallagher  
Acting Director, Safety/Rad Waste Directorate

Enclosure

Supplement 2 (Reference: NRC Form 313, block 6)

PURPOSES FOR WHICH THE SOURCE MATERIAL WILL BE USED

INTRODUCTION: The following two sections describe how the US Army will use the source material (depleted uranium). Section A, the largest section, describes the licensee's program for ammunition items. Section B covers depleted uranium fragments on the firing range at Lake City Army Ammunition Plant, Independence, Missouri.

SECTION A. DEPLETED URANIUM AMMUNITION

1. General: The licensee will use depleted uranium as a component part of conventional ammunition items. The depleted uranium component is in the form of a solid metal rod, commonly called a penetrator. The penetrators covered by this license vary in weight according to the ammunition model. Depending on the model of ammunition, some penetrators weigh several kilograms and others less than 1 kilogram.

1.1 The licensee will consider newly developed depleted uranium ammunition items for license coverage only after the developing organization, or service, has certified to the licensee that the item has been properly tested and is suitable for military use. Once approved by the licensee, newly developed depleted uranium ammunition items will be covered by this license without license amendment unless significantly different in design from currently fielded depleted uranium ammunition items.

1.2 All depleted uranium ammunition components are manufactured and assembled under separate Nuclear Regulatory Commission or agreement State licenses. The Headquarters, US Army Field Support Command, will receive newly produced ammunition items into the SUC-1380 license with the depleted uranium components fully assembled and packaged.

1.3 The Headquarters, US Army Field Support Command, will provide interim license coverage for standard depleted uranium munitions that other Army license holders have modified for testing purposes. This interim license coverage is to allow adequate time for these other license holders to decide on, and implement, the final disposition of the modified munitions. This license coverage is for US Army Field Support Command storage installations only (such as depots and ammunition plants) and

does not include installations (such as proving grounds or research, development, test, and evaluation facilities) that make the modifications or test the munitions. In addition, this license does not include testing or firing of depleted uranium munitions.

1.4 The Headquarters, US Army Field Support Command, will provide interim license coverage for foreign or captured depleted uranium ammunition items. This interim license coverage will allow adequate time for the owning organization to determine the need and use of the munitions and pay for their final disposition. Installations will store foreign or captured depleted uranium munitions in accordance with the associated explosive hazard and in buildings separate from United States depleted uranium munitions. Although the US Army Field Support Command is requesting authority to disassemble depleted uranium munitions under this license, that request does not extend to foreign or captured depleted uranium ammunition items.

1.5 The licensee will not use the depleted uranium covered by this license in any chemical, nuclear, or metallurgical processes. Under limited conditions, trained ammunition workers may briefly handle the depleted uranium component during disassembly operations, but no direct processing of the depleted uranium component, such as machining, cutting, grinding, etc., will occur.

2. Authorized Operations: Ammunition containing depleted uranium components will be involved in the following peacetime activities: storage, inspection, minor maintenance, transportation, render-safe, and disassembly. We explain these operations in the following paragraphs:

2.1 Storage: Conventional ammunition items containing depleted uranium components developed by the various services within the Department of Defense are authorized for storage at Army installations worldwide as war reserve material. Ammunition and components may also be stored at Army facilities pending final disposition.

2.1.1 The Headquarters, US Army Field Support Command, does not provide depleted uranium license coverage to other Army organizations that already have depleted uranium licenses for activities such as manufacturing or research, development, test, and evaluation. It is the position of the US Army Field Support

Command that these organizations provide license coverage for the depleted uranium munitions in their possession. This arrangement will reduce confusion by keeping the number of depleted uranium licenses in effect at any one installation to a minimum.

2.1.2 The Army primarily stores depleted uranium ammunition in standard ammunition storage structures and locates these structures inside security-fenced areas. Due to the security, sensitivity, and explosive hazard associated with ammunition items, the Army constructs these storage facilities to strictly limit the access of personnel, reducing the potential for loss of control and exposure of personnel to hazards.

2.1.3 As operational necessity dictates, the Army may store ammunition temporarily outdoors within security fenced areas. Ammunition temporarily stored in outdoor areas will be kept on pallets, in their shipping containers, and/or inside transport vehicles. These temporary ammunition storage areas will be located on Army installations that have 24-hour guard forces and will be provided security patrols in accordance with ammunition security procedures.

2.1.4 The Army establishes storage limitations for ammunition items on an item-by-item basis. Limitations are based upon the explosive hazard of each item and the physical capacity of the storage structure or vehicle. The quantity of depleted uranium within a storage structure or vehicle will not be a limiting factor. The explosive hazard classification for ammunition items are determined in accordance with Department of Defense explosive hazard classification procedures.

2.1.5 There are two categories of storage covered by this application; bulk storage and nonbulk storage. Bulk storage represents long-term storage of large amounts of ammunition. Bulk storage installations can store a maximum of 13 million kilograms of depleted uranium each. We identify the following as bulk storage installations within the continental United States. The Army chooses not to identify overseas storage locations.

- a. Anniston Army Depot, Anniston, Alabama.
- b. Bluegrass Army Depot, Richmond, Kentucky.
- c. Crane Army Ammunition Activity, Crane, Indiana.

d. Hawthorne Army Depot, Hawthorne, Nevada. Note: Hawthorne changed its name from Hawthorne Army Ammunition Plant to Hawthorne Army Depot in 1994.

e. Letterkenny Army Depot, Chambersburg, Pennsylvania.

f. McAlester Army Ammunition Plant, McAlester, Oklahoma.

g. Red River Army Depot, Texarkana, Texas.

h. Tooele Army Depot, Tooele, Utah.

2.1.5.1 In the following paragraphs, we discuss the status of two Army depots (Seneca Army Depot and Sierra Army Depot) that have been listed in the SUC-1380 license, but no longer store depleted uranium ammunition.

a. Seneca Army Depot, Romulus, New York. Seneca Army Depot formerly stored depleted uranium munitions under their SUC-1275 license as well as being listed in the US Army Field Support Command's SUC-1380 license. Seneca, through the US Army Corps of Engineers, hired Argonne National Laboratory to provide technical support and Parsons Engineering Sciences, Incorporated, to perform survey and sampling work. Seneca submitted a revised license termination plan, to Nuclear Regulatory Commission Region 1, on February 11, 2003. The Nuclear Regulatory Commission approved Seneca's termination plan in amendment 13 and letter dated September 17, 2003. The Seneca license termination plan includes provisions to close out Seneca Army Depot as a storage installation under the SUC-1380 license. Seneca Army Depot will remain listed in this license as a bulk storage installation until the US Army Field Support Command can provide documentation to the Nuclear Regulatory Commission that the decommissioning effort for the SUC-1275 license also covers the SUC-1380 license.

b. Sierra Army Depot, Herlong, California. We request the Nuclear Regulatory Commission remove Sierra Army Depot from the list of bulk storage installations covered by the SUC-1380 license. Sierra formerly stored depleted uranium munitions under their SUC-1274 license as well as being listed in the US Army Field Support Command SUC-1380 license. The Nuclear Regulatory Commission terminated Sierra's SUC-1274 license on December 5, 2001, in amendment 19. The US Army Corps of Engineers and the US Army Center for Health Promotion and Preventive Medicine did the survey and sampling work. The termination of the SUC-1274 license also served to close out Sierra Army Depot as a storage

installation under the SUC-1380 license. We have enclosed to this supplement the following documents on the termination of the SUC-1274 license and the closeout of Sierra Army Depot as a storage location under the SUC-1380 license.

a. Nuclear Regulatory Commission letter and amendment 19 to the SUC-1274 license, both dated December 5, 2001.

b. The executive summary of US Army Corps of Engineers License Termination and Site Release Survey Report for Sierra Army Depot, dated January 2001.

2.1.6 Nonbulk storage covers any Army installation that has a requirement to store lesser amounts of depleted uranium ammunition in support of military operations. Nonbulk storage installations can store a maximum of 50,000 kilograms of depleted uranium. Typical examples are installations that store depleted uranium ammunition in support of deployment, retrograde, shipment consolidation, or repair of military vehicles. Storage of depleted uranium ammunition under this category can range from a few days to long term.

2.1.7 As stated above, only US Army installations are authorized by this license for the storage and/or handling of depleted uranium ammunition. The US Air Force licenses air fields. The US Navy licenses Navy and Marine Corps facilities. Personnel working in ammunition operations under this license will be US Army civilian personnel, US Army military personnel, civilian personnel under contract to the US Army, or foreign nationals authorized to work at Army installations overseas.

2.2 Inspection: The Headquarters, US Army Field Support Command, directs ammunition inspections at Army installations. Most of the time, inspection procedures include a visual inspection of external surfaces for defects such as damage or corrosion. Occasionally, the licensee may have a need to disassemble depleted uranium ammunition items to visually inspect internal components. Inspection procedures that require functioning, firing, direct processing, or destruction of depleted uranium ammunition items will be performed under separate Nuclear Regulatory Commission or agreement State license. Headquarters, US Army Field Support Command determines disposition of unserviceable munitions or depleted uranium components.

2.3 Minor Maintenance: Occasionally, inspection of depleted uranium ammunition items will reveal conditions that require minor maintenance activities be performed to return them to a fully serviceable condition. The following types of minor maintenance activities that do not require disassembly, the handling of ammunition subassemblies, or the prolonged exposure of the depleted uranium component may be performed after Headquarters, US Army Field Support Command, grants approval:

- a. Linking and delinking of belted ammunition.
- b. Corrosion removal from nondepleted uranium components.
- c. Touchup painting and remarking of complete rounds.
- d. Repackaging of complete ammunition items.
- e. Preservation and repair of packaging.

2.3.1 Since minor maintenance operations do not involve direct or prolonged contact with the depleted uranium component of the munitions, no additional instructions or safety precautions which deviate from normal handling and storage instructions are required. The Army considers warning statements in technical manuals to be adequate radiological instructions.

2.3.2 Ammunition items containing depleted uranium components may reach a point where they require extensive renovation. The Army will return such ammunition items through the supply system to a separately licensed facility to perform the required work. Typically, extensive renovation involves disassembly of the ammunition round, so that work can be done on internal components.

2.4 Transportation: Transportation of depleted uranium ammunition items and components will comply with all transportation regulations applicable at the time of shipment unless specifically addressed in the following paragraphs:

2.4.1 The Army ships depleted uranium ammunition items under Department of Transportation Special Permit 9649. According to this Special Permit, the Department of Defense will ship depleted uranium ammunition items according to the primary explosive hazard as well as the secondary radioactive hazard. The Special Permit allows dose rates of 2.5 millirem per hour on contact with packages and grants relief from some radiation marking and labeling requirements. Overseas shipments of depleted uranium ammunition will comply with a Competent Authority document that is based on DOT-SP 9649.

2.4.2 Unless more restrictive guidance is published by the Army, depleted uranium munitions in their containers will not be subject to radiation surveys before shipment or upon receipt, unless found damaged. This is because shipments of depleted uranium will never exceed the Type A quantity as described in Appendix A to Title 10 Code of Federal Regulations 71, which is unlimited. In addition, it has been the Army's experience that containerized depleted uranium munitions have never been found leaking contamination and have always been below the 2.5 millirem per hour limit as required by the Department of Transportation Special Permit referenced above.

2.4.3 The Army inspects ammunition packages before loading onto a conveyance and when unloading from a conveyance. Installation personnel are to immediately notify the installation Radiation Safety Officer if they find damaged packages of depleted uranium ammunition. The Radiation Safety Officer or his/her designee will survey damaged packages with radiation detection instruments and wipe for removable contamination. The Radiation Safety Officer or Transportation Officer will make notifications required by Title 10 Code of Federal Regulations 20.1906(d) if the conveyance delivering the munitions is contaminated. Damaged packages found to be contaminated will be segregated and stored until the Radiation Safety Officer obtains final disposition from the Headquarters, US Army Field Support Command.

2.4.4 Transport to overseas locations will normally be via ship. Some ships may linger for several months in regions where United States military units may need ammunition on short notice. The licensee considers the ammunition aboard these ships to be in transport and not in storage.

2.4.5 Under peacetime conditions, the Army transports ammunition and weapon systems separately, although they may be on the same ship. Upload and stowage of depleted uranium ammunition into weapon systems, such as tanks or Bradley fighting vehicles, only occurs in war or the threat of war, and thus, are not covered in this license.

2.5 Render-safe: Ammunition items containing depleted uranium components may be found unsafe for shipment or handling. On these occasions, personnel trained in the handling of suspect ammunition items will render the item safe. The procedures implemented by these individuals will be primarily based upon the explosive hazard associated with the item.

2.5.1 Procedures to make a round of ammunition safe to handle result in the separation of the two major components of the round; the cartridge case and the projectile assembly. If mechanical separation is considered unsafe, the ammunition item will be subjected to a destructive separation. Destructive separation techniques will leave the cartridge case unusable, but will leave the projectile intact. The projectile, which contains the depleted uranium component, will be wrapped in plastic and stored until the Headquarters, US Army Field Support Command, determines final disposition. Normally, depleted uranium components resulting from operations to make the components safe to handle will not be stored in the same structure as serviceable munitions.

2.6 Disassembly: All ammunition items reach a point where they exceed their useful life. When this occurs, the Army sends the ammunition items back through the supply system to a facility capable of taking them apart. Disassembly renders the items unusable for their original military purpose. Because of this, the Army refers to disassembly operations as a form of demilitarization. The Headquarters, US Army Field Support Command, determines when ammunition items require demilitarization. Note: Supplements 4 and 5 of the license application contain more information on disassembly.

3. Amount of Material: The amount of depleted uranium involved in the activities described in paragraph 2 above will be based upon the explosive hazards associated with the ammunition item, the physical capacity of the storage structure or vehicle, and the operational requirements associated with the activity. In the following paragraphs, we discuss the anticipated quantities of depleted uranium that may be involved in each activity.

3.1 Storage: The anticipated quantity of depleted uranium in a single earth-covered storage structure could typically range between 4,536 and 136,078 kilograms (10,000 and 300,000 pounds), with some storage configurations approaching 204,117 kilograms (450,000 pounds). The quantity of depleted uranium in an aboveground structure could range between 45,356 and 272,155 kilograms (100,000 and 600,000 pounds), with some storage configurations approaching 771,107 kilograms (1,700,000 pounds). The anticipated maximum quantity of depleted uranium to be held in a temporary outdoor storage area is 36,287 kilograms (80,000 pounds), which is the amount that can be carried by two railcars.

3.2 Transportation: The anticipated quantity of depleted uranium in a single road or rail transport vehicle is based upon the gross weight limitation imposed on the vehicle. Rail transport vehicles could contain as much as 18,144 kilograms (40,000 pounds) of depleted uranium while road transport vehicles could contain up to 6,804 kilograms (15,000 pounds) of depleted uranium. Typical peacetime shipments of depleted uranium ammunition by an ocean vessel could involve between 136,078 and 408,233 kilograms (300,000 and 900,000 pounds) of depleted uranium.

3.3 Inspection: Inspection operations typically involve from one box to several pallets of ammunition. The anticipated quantity of depleted uranium involved in inspection operations could range from 4.54 to 907 kilograms (10 to 2,000 pounds).

3.4 Minor maintenance: Installation personnel will position working quantities of ammunition awaiting maintenance near the maintenance line. Minor maintenance operations typically involve from one box to several pallets of ammunition. As installation personnel remove finished ammunition items from the maintenance line, they will bring in additional items to keep the operation going. The anticipated quantity of depleted uranium involved in minor maintenance activities at any one time could range from 4.54 to 1,588 kilograms (10 to 3,500 pounds) of depleted uranium.

3.5 Render-safe: The Army implements render-safe operations on short notice when ammunition items are found, or suspected to be, unsafe to handle or ship. Because the Army does not plan render-safe operations in advance, the quantity of depleted uranium involved in such an operation cannot be forecast; however, it is anticipated that less than 15 kilograms (33 pounds) of depleted uranium would be involved at any one time.

3.6 Disassembly: Installation personnel will position working quantities of ammunition awaiting disassembly near the disassembly line. Typical working quantities will involve from one box to several pallets of ammunition. As installation personnel take ammunition items apart and remove the components from the disassembly line, they will bring in additional ammunition items to keep the operation going. The anticipated quantity of depleted uranium involved in disassembly activities at any one time could range from 4.54 to 1,588 kilograms (10 to 3,500 pounds) of depleted uranium.

4. Accountability: The Army has developed specific procedures to provide for accountability of ammunition at storage locations, by military groups, and in transit between installations. Additionally, the Army has developed a centralized reporting system to provide worldwide stockpile visibility. This system is used to assist in stockpile, production, and logistics planning. The centralized reporting system used by the Army keeps track of ammunition in storage and transport in 100-round increments. Ammunition that has been issued to individual Army units is not maintained within the centralized reporting system.

4.1 The inventory records maintained by each installation and each military unit keep track of ammunition items in single round increments and are used for accountability purposes. Installations update their inventory records after each receipt, shipment, or disbursement. In addition to the rigorous inventory and accountability procedures, all ammunition items are maintained under constant physical security.

4.2 The Headquarters, US Army Field Support Command, compares the ammunition records of Government-owned, contractor-operated installations to the Headquarters, US Army Field Support Command, accountable record annually. The Headquarters, US Army Field Support Command, compares the records of Government-owned, Government-operated installations to the accountable record on a monthly basis. If the records do not match, Headquarters, US Army Field Support Command, personnel research the discrepancy and initiate an investigation if necessary.

4.3 Ammunition shipped to another location or unit is subject to a 100-percent inspection. This inspection includes verification of the national stock number and quantity as part of the shipment process. Installations shipping ammunition send a notice of the shipment to the receiving installation separate from the actual shipment. Upon receipt, the receiving installation verifies the

quantity of ammunition in the shipment against the quantity on the shipping documents. Additionally, a copy of the incoming inventory is sent to the installation originating the shipment. This inventory notifies the point of origin that the shipment has arrived.

4.4 Ammunition issued to individual military units is accountable property. An individual within the unit that receives the ammunition signs for it. This individual is personally accountable for all of the ammunition within the unit. This responsibility is relinquished only when the ammunition is expended or turned in to an ammunition storage activity. Ammunition that is turned in to an installation is added to that installation's inventory, and a receipt is issued to the unit showing the disposition of the ammunition. Installations that issue ammunition to military units perform a physical inventory of their munitions at least once a year.

4.5 Physical security is maintained by storing ammunition inside secure, limited access areas, such as: security fenced areas and/or locked storage structures. Army installations storing ammunition have a 24-hour a day guard force, and ammunition storage areas are provided security patrols. Entry to ammunition storage areas is limited to specifically designated individuals. Additionally, only selected individuals are allowed access to the keys to unlock storage areas.

RADIATION SAFETY PROGRAM

1. Introduction. The Army, through the chain of command to individual installations, has developed radiation safety programs to protect employees and the general public from ionizing radiation. In addition, each installation has developed safety procedures for the handling of ammunition and explosives that reduce the likelihood of fires, explosions, and physical damage to the ammunition items. These procedures have resulted in a relatively accident-free environment. The small number of incidents that have occurred have consisted of scratches and scrapes on vehicles and packages, with little or no damage to the ammunition items. The safety procedures implemented for depleted uranium ammunition items include, but are not limited to, the following:

1.1 Radiological surveillance of storage and use areas.

1.2 Local inventory and accountability of ammunition items containing depleted uranium components.

1.3 Periodic inspections and evaluations by commands having jurisdiction over the facility.

1.4 Regular inspections of work and storage areas and transport vehicles by installation personnel.

1.5 Housekeeping procedures to minimize or eliminate unnecessary combustible material in and around storage areas, work areas, and transport vehicles.

1.6 Use of lightning protection systems around work areas and many types of storage structures.

1.7 Securing depleted uranium ammunition items within specially designed areas and structures and in vehicles during transit.

1.8 Storing noncompatible ammunition and explosive items separately from depleted uranium munitions.

1.9 Publishing basic radiological safety information in user manuals. Some examples of this type of information are at the first enclosure to this supplement.

1.10 Designating radiation safety officers to implement unit or installation radiation safety programs.

1.11 Maintaining a working environment where exposure to ionizing radiation is as low as reasonably achievable.

2. Ammunition Surveillance: Supplementing the controls described in the paragraphs above, the Department of the Army, in its role as the Single Manager for Conventional Ammunition for the Joint Services, operates the Quality Assurance Specialist Ammunition Surveillance program. This program consists of individuals trained specifically to perform surveillance inspections to verify the condition and serviceability of all ammunition items in the Department of Defense stockpile.

2.1 The Quality Assurance Specialists Ammunition Surveillance use published inspection criteria to visually inspect depleted uranium ammunition at locations and times determined by Headquarters, US Army Field Support Command. One of the things Quality Assurance Specialists Ammunition Surveillance look for when inspecting depleted uranium munitions is corrosion product. Evidence of depleted uranium corrosion may indicate that additional inspection and investigation is necessary to determine the cause and extent of the problem. Inspection intervals and criteria, as set by Headquarters, US Army Field Support Command, allows for adequate detection of problems.

3. Radiation Levels: The following paragraphs describe the radiation levels associated with depleted uranium ammunition.

3.1 Ammunition packages. The Department of Defense predominantly stores depleted uranium ammunition in metal containers, but does use a number of wooden boxes. The maximum penetrating dose rate on the surface of any ammunition package or a pallet of packages is less than the 2.5-millirem-per-hour dose rate limit required for shipment under Department of Transportation Special Permit 9649. As an example, the maximum penetrating dose rate on the surface of a single container of the largest currently existing depleted uranium ammunition round (the M829A3) is 0.34 millirad per hour. The highest dose on contact with a pallet of these containers is 1.03 millirad per hour.

3.2 Routine operations. The Army does not require personal monitoring devices for routine handling operations. For the

majority of their lifetime, depleted uranium ammunition items remain in their containers and are stored in secure Army facilities. When outside of their container, ammunition items are handled for relatively short time periods. In addition, workers enter or work in ammunition storage buildings on a very infrequent basis.

3.2.1 If unexpected situations arise, the installation radiation safety officer will institute a personnel dosimetry program if administrative protective measures cannot be reasonably implemented or fail to reduce exposures to within 10 percent of the dose limits. If required, the installation will request dosimetry services from the US Army Test, Measurement, and Diagnostic Equipment Activity, Redstone Arsenal, Alabama, or equivalent provider.

3.2.2 Unless personnel dosimetry is required, routine handling and storage areas are considered radiologically unrestricted areas.

3.3 Disassembly operations. The Headquarters, US Army Field Support Command, Safety/Rad Waste Directorate contracted with Aerojet, Incorporated, to provide a dose assessment report on depleted uranium ammunition disassembly operations. The following information comes from that report:

3.3.1 The Aerojet report states, "It is likely that a worker could exceed 10 percent of the dose limits for the estimated dose criteria for the skin, extremity, and lens of the eye." The report goes on to say, "If safety glasses and medium weight gloves are worn while handling bare penetrators, the dose limit for lens of the eye, extremity, and skin dose should not be exceeded."

3.3.2 The Aerojet report shows that whole body exposure is well below 10 percent of the annual limit for disassembly of all munitions except for the 25 millimeter, M919. The anticipated whole body exposure for the 25 millimeter, M919, is 0.251 millirem per hour ( $2.51E-6$  Sievert per hour). Assuming constant workload throughout an entire year (2,000 hours), this equates to 502 millirem per year or approximately 10 percent of the annual whole body dose limit. The anticipated whole body exposure for 105 millimeter rounds is slightly less than half of this, and the anticipated whole body exposure for 120-millimeter and 30-millimeter rounds is even less.

3.3.3 The licensee will consider individuals involved in disassembly operations as occupational workers. As recommended in the Aerojet dose assessment report, the licensee will require safety glasses, gloves, and extremity dosimeters for workers who handle depleted uranium penetrators during disassembly line operations. The licensee will consider the use of extremity dosimeters for disassembly line workers who handle depleted uranium penetrators encased in aluminum. The licensee will not require whole body dosimeters for 30-, 105-, and 120-millimeter disassembly operations unless exposure levels are found, or anticipated to be, in excess of 10 percent of the annual whole body dose (10 percent of the whole body dose is 500 millirem per year). The licensee believes it prudent to require whole body dosimeters for disassembly of 25-millimeter, M919, munitions at least until experience with 25-millimeter disassembly is obtained and actual exposure data shows clearly that workers receive less than 10 percent of the annual limit.

3.3.4 Personnel who briefly handle a small number of depleted uranium penetrators will wear gloves, but will not have to wear extremity or whole body dosimeters.

3.3.5 If necessary, installations will institute administrative controls to maintain exposures within 10 percent of the annual whole body occupational worker limit (10 percent of 5,000 millirem per year is 500 millirem per year). If required, the installation will request dosimetry services from the US Army Test, Measurement, and Diagnostic Equipment Activity, Redstone Arsenal, Alabama, or equivalent provider.

4. Posting and Employee Notification: Within the continental United States, facilities used for storing or disassembling depleted uranium ammunition items will be posted with "Caution Radioactive Material" signs. Overseas, Army installations will post "Caution Radioactive Material" signs in accordance with host nation agreements or at the discretion of the installation commander for security reasons.

4.1 Installation radiation safety officers will post Section 206 of the 1974 Energy Reorganization Act and NRC Form 3 at central locations where ammunition workers can view them, such as bulletin boards in break rooms or in the building where keys to the storage magazines are drawn. In addition, information will be posted with these two documents stating that other applicable documents, such as the license, Federal regulations, and Army regulations can be viewed in the office of the radiation safety officer.

4.2 Installation personnel may request copies of the following documents by contacting the Headquarters, US Army Field Support Command, radiation safety officer at commercial (309) 782-0338/2969/2989 or defense switched network 793-0338/2969/2989:

a. Title 10 Code of Federal Regulations Part 19 - Notices, Instructions, and Reports to Workers; Inspections.

b. Title 10 Code of Federal Regulations Part 20 - Standards for Protection Against Radiation.

c. Title 10 Code of Federal Regulations Part 21 - Reporting of Defects and Noncompliance.

d. Section 206 of the 1974 Energy Reorganization Act.

e. License application and amendment.

f. NRC Form 3.

g. NRC Regulatory Guide 8.13.

h. NRC Regulatory Guide 8.29.

5. Radiological Surveys. Each Army installation possessing depleted uranium ammunition cartridges and/or components under this license will perform radiological surveys of their facilities as outlined in this section. Surveys will include the taking of wipes to check for removable contamination and the use of a beta/gamma instrument to check exposure levels. It is the responsibility of the installation radiation safety officer to ensure radiation surveys are done accurately.

5.1 Storage structures.

5.1.1 Structures storing complete rounds. Each installation will have a storage structure survey program and will perform annual surveys in 25 percent of the total number of on-post structures storing complete depleted uranium ammunition cartridges. Note: During times of war or threat of war, installations outside the continental United States in affected theatres of operation as well as continental United States installations (such as forts) heavily engaged in supporting the overseas operation will be relieved of the annual survey requirement.

5.1.2 Structures storing ammunition components. Installations will survey buildings storing depleted uranium components that are encased in aluminum at least once a year. Installations will survey buildings storing depleted uranium components that are not encased in aluminum at least twice a year.

5.2 Ammunition surveillance workshops. Installations will include ammunition surveillance workshops in their storage structure survey program. Ammunition surveillance workshops will be surveyed daily if depleted uranium ammunition components are inspected.

5.3 Ammunition maintenance lines. Each installation will perform a radiological survey of depleted uranium ammunition maintenance lines on a weekly basis. As stated in supplement 2, section A, this license authorizes minor maintenance on complete cartridges and does not authorize maintenance on cartridge subassemblies.

5.4 Ammunition disassembly lines. During the first 2 weeks of operating a depleted uranium ammunition disassembly line, the installation will perform daily radiological surveys. Installations will pay particular attention to work areas where workers handle depleted uranium or components that have been in direct contact with the depleted uranium. The frequency between subsequent surveys may be lengthened to twice a week if contamination is found below the contamination limits specified in paragraph 8 of this supplement. This survey frequency will continue for at least 2 weeks. If contamination continues to be found below the limits identified in paragraph 8 of the supplement, the installation RSO may request approval from the license RSO to lengthen the survey frequency to once every other week.

5.5 Installation personnel will check radiological wipes with a beta/gamma detection instrument before sending the wipes to the laboratory.

5.6 The licensee will obtain laboratory service from the US Army Test, Measurement, and Diagnostic Equipment Activity, Redstone Arsenal, Alabama, or equivalent provider, or a lab approved by the US Army Test, Measurement, and Diagnostic Equipment Activity, Redstone Arsenal, Alabama, to analyze radiological wipes.

6. Disassembly. All models of depleted uranium ammunition are similar in that they consist of two major components: the projectile assembly and the cartridge case. During disassembly operations, the Army mechanically separates these two major components. At the second enclosure of this supplement are drawings of these major components for one model of depleted uranium ammunition. The drawings show: a complete round, a cut-away of a complete round, and finally the cartridge case and projectile assembly separated from each other. The Army may ship the projectile assemblies to a separately licensed facility for further disassembly or, when deemed advantageous, the Army will take apart the projectile assembly. Workers involved in taking apart projectile assemblies will have some contact with the depleted uranium penetrator.

6.1 Projects to disassemble depleted uranium munitions will include the removal and proper disposal of all explosive components, and the removal of the depleted uranium for recycling, reuse, or disposal as radioactive waste. The licensee will not subject the depleted uranium to any form of drilling, cutting, or mechanical abrasion.

6.2 Personnel involved in disassembly operations will wear personal protective equipment, such as; , safety eyewear, safety footwear, and gloves. Since the depleted uranium will not be subjected to operations that could cause an airborne hazard, workers will not wear respiratory protective equipment. Before individuals leave the disassembly area, they will be monitored for radiological contamination. A disassembly line for munitions with aluminum encased depleted uranium projectiles will be an exception. Due to the low probability of depleted uranium contamination, individuals leaving the area where aluminum encased depleted uranium munitions are disassembled will be randomly monitored for radiological contamination.

6.2.1 No eating, drinking, gum chewing, tobacco use, or the application of cosmetics will be allowed in depleted uranium ammunition storage, handling, or disassembly areas. As required by Nuclear Regulatory Commission guidance, exposure to ionizing radiation will be limited to levels that are as low as reasonably achievable.

6.3 If possible, installations that store depleted uranium penetrators or contaminated components will do so in buildings separate from serviceable munitions. The Headquarters, US Army Field Support Command, Safety/Rad Waste Directorate will provide instructions to the installation for disposition of items generated during demilitarization operations.

6.4 At other licensed facilities, such as Savanna Army Depot Activity (Nuclear Regulatory Commission license SUC-1394, terminated) and the Iowa Army Ammunition Plant (Iowa State license 0290-1-29-SM1, formerly Nuclear Regulatory Commission license SUC-1381), the disassembly of ammunition items containing depleted uranium has caused little, if any, contamination. Likewise, exposures to personnel have been low.

6.5 The Headquarters, US Army Field Support Command, will determine which Government-owned, Government-operated installations will perform disassembly operations. When making these decisions, the Headquarters, US Army Field Support Command, will take into consideration the location of the assets to be disassembled, the availability of adequate facilities and equipment, and the status of the installation's radiation safety program to include the qualifications of radiation safety personnel.

6.5.1 The Headquarters, US Army Field Support Command, Safety/Rad Waste Directorate will approve each Government-owned, Government-operated installation for depleted uranium ammunition disassembly before operations begin at that installation. The Safety/Rad Waste Directorate will base its approval upon the installation being able to meet all license requirements.

6.6 Worker training. Installations will ensure training is provided to individuals who work in depleted uranium ammunition disassembly operations and that the training is documented. Normally, the installation radiation safety officer will provide the training, although other Government or contractor personnel can provide the training as long as they are knowledgeable in radiation safety and can explain the topics identified in the following paragraph:

6.6.1 Installations will provide initial training before disassembly operations begin and annual refresher training thereafter. This training will last approximately 1 hour and cover the following topics at a minimum; radiological characteristics of depleted uranium, biological effects of radiation, methods of protection, emergency procedures, postings, and reference documents. Workers will take a test for each training session. The installation radiation safety officer will ensure Nuclear Regulatory Commission Regulatory Guides 8.13 and 8.29 are available to interested personnel.

6.7 Operating procedures and demilitarization plan.

Installation personnel will develop operating procedures and a demilitarization plan for disassembly operations. The radiation safety officer of the installation will assist in the development of these documents and will coordinate with the licensee as necessary. The installation will obtain the approval of the licensee when the demilitarization plan is finalized. Installation radiation safety officers will implement radiation protection programs at their installations in accordance with license conditions as well as Federal and Army regulations.

6.8 The operations described in Section A of this Supplement (including disassembly) do not require a decommissioning funding plan per Title 10 Code of Federal Regulations, section 40.36, since the operations described in Section A will not involve depleted uranium in dispersible form. The licensee does have a financial assurance document (statement of intent) in place for the depleted uranium on the Lake City Army Ammunition Plant firing range. Information on the Lake City firing range is in Section B of Supplement 2.

7. Emergency Response: The Army has developed emergency procedures for handling, storage, and transportation accidents involving depleted uranium ammunition items. These procedures are detailed in Technical Bulletin 9-1300-278, Guidelines for Safe Response to Handling, Storage, and Transportation Accidents Involving Army Tank Munitions which Contain Depleted Uranium, which is distributed throughout the Army. In addition, each storage and using location has developed specific emergency procedures for use with operations involving ammunition items.

7.1 Ammunition items are designed to withstand extreme environmental conditions and rough handling without being a hazard to either the user or the environment. Accidents involving ammunition items containing depleted uranium components that are not associated with a fire or the threat of a fire pose little or no radiological hazard and will be handled in accordance with local procedures that are based primarily upon the explosive hazard of the item.

7.2 The response to a fire involving ammunition is generally based upon the location of the fire, the potential threat to human life, and the explosive hazard associated with the munitions involved in the fire. In all cases, the senior fire officer present will make fire-fighting decisions.

7.3 Fires involving depleted uranium ammunition items have a dual hazard. The primary hazard is that of the explosives associated with the munitions. Secondary to the explosive hazard is the potential radiation hazard associated with oxidized depleted uranium. When depleted uranium ammunition items become involved in a fire, a very small portion of the depleted uranium may become aerosolized and migrate with the smoke plume. The Army considers the concentration of depleted uranium to be found in the inhalation exposure pathway from a fire plume involving depleted uranium munitions and/or armor to be low/insignificant based on data collected from various laboratory and field studies of burning depleted uranium penetrators and depleted uranium armor. The majority of the depleted uranium involved in a fire remains at the scene. This depleted uranium can pose an external radiation hazard if it remains in contact with the skin for an extended period of time. The depleted uranium remaining in the vicinity of the fire has been analyzed and has been found to be highly nonrespirable and highly nonsoluble in lung fluid. The small portion of this depleted uranium that is respirable can be an internal radiation hazard through inhalation if it is suspended in the air. Suspension could occur due to wind, explosion, or the activity of recovery crews. Because the depleted uranium, which remains at the scene of the fire, is highly nonsoluble in lung fluid, the primary internal hazard of this depleted uranium is not chemical toxicity, but is the radiation exposure to the lung.

7.4 Historically, the occurrence of fires or explosions involving finished ammunition items for all services is rare. Burn tests conducted by the Army and Air Force have shown that only small quantities of depleted uranium are released into the environment if a fire should involve ammunition items containing depleted uranium components. The extreme density of depleted uranium tends to result in its being deposited in the immediate area of the fire.

7.5 Fires aboard ocean-going vessels are generally fought to the maximum extent possible by all available personnel. Land-based fires involving munitions with a mass detonation, fragmentation, or mass fire hazard are not fought on a routine basis. For these types of fires, the area is generally evacuated, and attempts are made to fight incipient fires that are generated by the main fire. Fires involving munitions with a moderate fire hazard are generally fought. Additionally, fires posing a serious threat to human life may also be fought.

7.6 No special fire-fighting equipment is needed beyond that commonly worn by fire-fighting personnel. Typical fire-fighting gear and self-contained breathing apparatus is adequate. Although the smoke plume poses a small radiation hazard, personnel downwind of a fire involving depleted uranium ammunition should be evacuated mostly due to the possible presence of other nonradiological products in the smoke.

8. Surface Contamination Limits: Installations will consider a surface contaminated if one or more of the levels listed below are exceeded. These levels apply to alpha emission of the material covered by this license and associated decay products.

AVERAGE (fixed and removable) <sup>a,b</sup>	MAXIMUM (fixed and removable) <sup>a,c</sup>	REMOVABLE <sup>a,d</sup>
5,000 dpm / 100 cm <sup>2</sup>	15,000 dpm / 100 cm <sup>2</sup>	1,000 dpm / 100 cm <sup>2</sup>

Note a - As used here, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

Note b - Measurements of average fixed and removable contaminant should not be averaged over more than 1 square meter. For objects of less surface area, the average should be derived for each such object.

Note c - The maximum fixed and removable contamination level applies to an area of not more than 100-square centimeters (100 cm<sup>2</sup>).

Note d - The amount of removable radioactive material per 100-square centimeters of surface area should be determined by wiping the area with dry filter or soft absorbent paper, applying moderate pressure, and then assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of surface area less than 100-square centimeters is determined, the activity per unit area should be based on the actual area and the entire surface should be wiped. It is not necessary to use wiping techniques to measure removable contamination levels if direct scan surveys show that the total residual surface contamination levels are within the limits for removable contamination.

8.1 Cleanup of depleted uranium contaminated soil will be to levels less than, or equal to, 35 picoCuries of depleted uranium/gram of soil. In addition, cleanup operations at accident sites will be conducted based upon the explosive and the radiological hazards associated with the material involved.

8.2 In all cases, radiological cleanup will be to levels that are as low as reasonably achievable.

9. Reporting: Accidents and incidents involving ammunition items containing depleted uranium components will be reported in accordance with Army procedures to the local radiation safety officer. The local radiation safety officer will report any accident or incident to the license radiation safety officer. The license radiation safety officer will report accidents and incidents to the Nuclear Regulatory Commission as required. Reports to the Nuclear Regulatory Commission will be made to the Nuclear Regulatory Commission regional office serving the license radiation safety officer regardless of the location of the accident or incident.

9.1 The following types of accidents and incidents will be reported as expeditiously as possible through the Army accident reporting system to the local radiation safety officer and license radiation safety officer:

a. Theft or loss of control of ammunition items containing depleted uranium components.

b. Functioning of ammunition items containing depleted uranium components.

c. Fires, explosions, or accidents involving storage structures, transport vehicles, or Army weapon systems that contain depleted uranium ammunition where the ammunition items are or could be damaged.

d. Accidents or incidents that damage or expose the depleted uranium components to the environment, or release depleted uranium to the environment.

9.2 Initial notification for the above types of accidents and incidents will be made telephonically or by priority message with a written followup report. When required, the license radiation safety officer will contact the Nuclear Regulatory Commission. Followup reports will be submitted to the Nuclear Regulatory Commission as the situation requires.

9.3 Unless specifically directed otherwise, only unclassified information will be transmitted to the Nuclear Regulatory Commission.

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