



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

February 22, 2019

MEMORANDUM TO: James Trapp, Director  
Division of Nuclear Materials Safety, Region I

David Pelton, Director  
Division of Nuclear Materials Safety, Region III

Troy Pruett, Director  
Division of Nuclear Materials Safety, Region IV

Andrea Kock, Director  
Division of Materials Safety, Security, State,  
and Tribal Programs  
Office of Nuclear Material Safety  
and Safeguards

FROM: John R. Tappert, Director */RA/*  
Division of Decommissioning, Uranium Recovery,  
and Waste Programs  
Office of Nuclear Material Safety  
and Safeguards

SUBJECT: IMPLEMENTATION PLAN TO IDENTIFY DEPLETED URANIUM ON  
MILITARY RANGES AND DETERMINE ITS LICENSING STATUS

The U.S. Nuclear Regulatory Commission (NRC) staff developed the enclosed implementation plan to identify depleted uranium (DU<sup>1</sup>) on military ranges and determine its licensing status. The implementation plan is focused on DU (e.g., spent munitions, armor, other items) that remains on active or inactive military ranges and provides a strategy for confirming that the possession of all DU on active and inactive military ranges<sup>2</sup> is currently either: 1) authorized by

---

<sup>1</sup> Natural uranium is made up of three isotopes: U-234, U-235, and U-238. "Depleted" uranium, or DU, has a lower percentage of U-234 and U-235 than natural uranium and is less radioactive. Per 10 CFR 40.4, Definitions, DU means the source material uranium in which the isotope uranium-235 is less than 0.711 weight percent of the total uranium present. DU does not include special nuclear material.

<sup>2</sup> NRC's regulatory authority covers DU under military control. DU is a source material, and section 63 of the AEA authorizes the Commission to issue licenses for source material for the "conduct of research and development activities of the types specified in Section 31." Section 31.a.3 of the AEA provides that such research and development activities include the use of "radioactive material for medical, biological, agricultural, health, or *military* purposes" (emphasis added). The NRC's jurisdiction over military uses, such as the testing and development of DU as part of weapons systems, falls within research and development activities with a military purpose over which the AEA gives the NRC authority. Under section 31.a, the NRC licenses "persons," which section 11.s defines to include "Government Agenc[ies] other than the Commission." Therefore, the NRC can issue licenses to the U.S. Department of Defense, including its Military Departments (the Army, Navy, and Air Force), under this provision.

an NRC license or 2) being addressed through the Memorandum of Understanding (MOU) between the NRC and U.S. Department of Defense (DoD) for Coordination on Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Response Actions at DoD Sites with Radioactive Materials (ADAMS Accession No. ML16092A294).<sup>3</sup>

In developing the implementation plan, the NRC staff was informed by previous DU licensing (i.e., the NRC's previous approach related to unlicensed Davy Crockett DU) and established an NRC-wide strategy to ensure that any identified unlicensed DU comes under appropriate NRC oversight. The NRC staff developed a process that would have the U.S. Navy Master Materials Licensees<sup>4</sup> and the U.S. Air Force Master Materials Licensees (MMLs) and the U.S. Department of the Army (Army),<sup>5,6</sup> confirm that all of the DU that remains on active and inactive ranges is under NRC regulatory oversight, while minimizing unnecessary regulatory burden.

The NRC Regional Offices reviewed this implementation plan, provided insights, and contributed significantly to the development of the milestones and estimated resources needed to implement this plan and its attachments. The NRC staff also discussed the approaches in this plan with the military. The NRC staff understands that the activities discussed in this plan will start after this memorandum is issued and resources are allocated to perform the work.

The NRC staff's implementation plan consists of the following sections that are described in detail in the enclosure to this memorandum and outlined below:

- Purpose and Background
- Implementation Steps
  - **Step 1, Identify ranges containing DU**
    - Step 1(a), Discuss the DU Implementation Plan in more detail with the Navy, Air Force, and Army
    - Step 1(b), Identify unlicensed ranges that contain DU and are subject to the NRC/DoD MOU
    - Step 1(c), Identify any additional information needed for licensed ranges that contain DU
  - **Step 2, Confirm the licensing status of DU on military ranges**

---

<sup>3</sup> At a public meeting, Office of Nuclear Material Safety and Safeguards (NMSS) staff committed to evaluate the potential for the presence of DU, other than the Davy Crockett Weapon System DU, on the Hawaiian installations (ADAMS Accession No. ML13352A214). This implementation plan will enable the NRC to fulfill this commitment. Following this implementation plan, the NRC staff will identify DU from NRC historical records and confirm such records with the DoD.

<sup>4</sup> The U.S. Navy MML includes radiological material possessed by the U.S. Marines that is under NRC regulatory oversight.

<sup>5</sup> The U.S. Army has specific licenses for sites with DU and does not hold an MML.

<sup>6</sup> License Conditions (LCs) 12 and 13 of the Davy Crockett license (SUC-1593) require the Army to notify the NRC if it identifies any information that indicates that Davy Crockett DU is present anywhere other than the installations already licensed. These LCs do not require the Army to search for additional DU from other weapon systems.

Step 2(a), Issue a confirmation request for identified ranges; if any ranges are unlicensed, move to Step 3

Step 2(b), Confirm response through inspection, if necessary

- **Step 3, Determine appropriate regulatory oversight of unlicensed DU**

Step 3(a), Determine if licensing or inclusion in the MOU is appropriate

- Resource Analysis

- 

Enclosure:

Implementation Plan for Identification of Depleted Uranium on U.S. Military Ranges and Its Licensing Status

With Attachments:

1. Information for NRC Staff Consideration During Plan Implementation
2. Current Source Materials Licenses for Depleted Uranium
3. Resource Analysis

SUBJECT: IMPLEMENTATION PLAN TO IDENTIFY DEPLETED URANIUM ON MILITARY RANGES AND DETERMINE ITS LICENSING STATUS  
**DATE FEBRUARY 22, 2019**

**DISTRIBUTION:**

DUWP r/f	M. Simmons, RIV	S. Seeley, RI	V. Campbell, RIV
R. Evans, RIV	E. Ullrich, RI	L. Howell, RIV	R. Kellar, RIV
B. Parker, RIII	D. Janda, RI	M. Shaffer, RIV	O. Masnyk Bailey, RI
A. Kock, DUWP	K. Conway, DUWP	R. Chang, DUWP	M. LaFranzo, RIII
R. Browder, RIV	M. Hay, RIV		

**ADAMS Accession No.: ML18157A033 (Pkg.)**

<b>OFC</b>	DUWP/MDB	DUWP/MDB	Region I	Region II	Region III
<b>NAME</b>	DMisenhimer	CHolston	RPowell	NA	MKunowski
<b>DATE</b>	02/14/18	12/8/16	5/10/18		5/10/18
<b>OFC</b>	Region IV	MSST/MSLB	DUWP/MDB	OGC	DUWP
<b>NAME</b>	R.Evans for RKellar	SCrane	SKoenick	TBarczy	JTappert
<b>DATE</b>	05/29/18	6/6/18	7/13/18	10/30/18	2/22/2019

**OFFICIAL RECORD COPY**

# IMPLEMENTATION PLAN FOR IDENTIFICATION OF DEPLETED URANIUM ON U.S. MILITARY RANGES AND ITS LICENSING STATUS

## Purpose

The U.S. Nuclear Regulatory Commission (NRC) staff developed this implementation plan to identify depleted uranium (DU<sup>1</sup>) spent munitions, armor, and other items, used on U.S. military ranges (for training and other purposes) and determine its licensing status. The plan's primary objective is to provide the strategy that will enable the NRC to confirm that all DU on active or inactive military ranges is either authorized by an NRC license or addressed through the NRC/U.S. Department of Defense (DoD) Memorandum of Understanding (MOU) for Coordination on Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Response Actions at DoD Sites with Radioactive Materials (Agencywide Documents Access and Management System [ADAMS] Accession No. ML16092A294).

## Background

### Regulations

The NRC has a statutory responsibility to protect public health and safety and promote the common defense and security with respect to the possession and use of source, byproduct, and special nuclear material under the Atomic Energy Act of 1954, Public Law 83-703, 68 Stat, 919, as amended (AEA). This responsibility includes licensing, oversight, decommissioning, and remediation of facilities or sites that possess and use source material subject to the NRC's authority. Through its licensing and oversight functions, the NRC ensures that these facilities and sites meet the requirements set forth in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 20, "Standards for Protection Against Radiation," such that radiation levels are protective of the site personnel, ensure the health and safety of the public, and protect the environment.

DU is a source material regulated under 10 CFR Part 40, "Domestic Licensing of Source Material." The requirement to obtain an NRC license for source material is established in Section 62 of the AEA. Section 40.3 of the NRC's regulations provides:

[a] person subject to the regulations in this part may not receive title to, own, receive, possess, use, transfer, provide for long-term care, deliver or dispose of byproduct material or residual radioactive material as defined in this part or any source material after removal from its place of deposit in nature, unless authorized in a specific or general license issued by the Commission under the regulations in this part.

ENCLOSURE

---

<sup>1</sup> Per 10 CFR 40.4, Definitions, DU means "the source material uranium in which the isotope uranium-235 is less than 0.711 weight percent of the total uranium present. DU does not include special nuclear material."

Possession of greater than small quantities of DU, as defined in 10 CFR 40.22, must be authorized by a specific license. For small quantities of DU, a general license is available as stated in 10 CFR 40.22:

(a) A general license is hereby issued authorizing commercial and industrial firms; research, educational, and medical institutions; and Federal, State, and local government agencies to receive, possess, use, and transfer uranium and thorium, in their natural isotopic concentrations and in the form of depleted uranium, for research, development, educational, commercial, or operational purposes in the following forms and quantities:

(1) No more than 1.5 kg (3.3 lb) of uranium and thorium in dispersible forms (e.g., gaseous, liquid, powder, etc.) at any one time. Any material processed by the general licensee that alters the chemical or physical form of the material containing source material must be accounted for as a dispersible form. A person authorized to possess, use, and transfer source material under this paragraph may not receive more than a total of 7 kg (15.4 lb) of uranium and thorium in any one calendar year. Persons possessing source material in excess of these limits as of August 27, 2013, may continue to possess up to 7 kg (15.4 lb) of uranium and thorium at any one time for one year beyond this date, or until the Commission takes final action on a pending application submitted on or before August 27, 2014, for a specific license for such material; and receive up to 70 kg (154 lb) of uranium or thorium in any one calendar year until December 31, 2014, or until the Commission takes final action on a pending application submitted on or before August 27, 2014, for a specific license for such material; and

(2) No more than a total of 7 kg (15.4 lb) of uranium and thorium at any one time. A person authorized to possess, use, and transfer source material under this paragraph may not receive more than a total of 70 kg (154 lb) of uranium and thorium in any one calendar year. A person may not alter the chemical or physical form of the source material possessed under this paragraph unless it is accounted for under the limits of paragraph (a)(1) of this section; or

(3) No more than 7 kg (15.4 lb) of uranium, removed during the treatment of drinking water, at any one time. A person may not remove more than 70 kg (154 lb) of uranium from drinking water during a calendar year under this paragraph; or

(4) No more than 7 kg (15.4 lb) of uranium and thorium at laboratories for the purpose of determining the concentration of uranium and thorium contained within the material being analyzed at any one time. A person authorized to possess, use, and transfer source material under this paragraph may not receive more than a total of 70 kg (154 lb) of source material in any one calendar year.

### Regulatory Guidance

The NRC does not have regulatory guidance specific to DU on military ranges. The staff has applied licensing guidance from NUREG-1556, Vol. 7, "Program-Specific Guidance about Academic, Research and Development, and Other Licenses of Limited Scope Including Gas Chromatographs and X-Ray Fluorescence Analyzers." Attachment 1 to this plan summarizes the regulatory guidance that the NRC staff has used in the past for licensing and oversight

activities of this material. Additional licensing guidance may be developed as part of the implementation of this plan.

### NRC's Scope of Licensing

Licenses for DU commonly address the possession, storage, inventory management, and waste management of DU. Refer to Attachment 2 of this implementation plan for a list of the current licenses or Master Materials Licenses (MMLs) issued to the military for DU. Licensees are required to ensure radiation protection of the military personnel, the public, and the environment. In addition, safety assessments should include an analysis of radiation doses and exposure pathways to determine compliance with 10 CFR 20.1302, "Compliance with dose limits for individual members of the public." For example, for SUC-1593, the air pathway was assessed for exposure to aerosolization of the DU on active firing ranges. This scenario is common on many ranges, especially those with unexploded ordnance.

### Current Licenses

The NRC has issued source materials licenses to the U.S. Military (for the Army, specific licenses; for the Navy and Air Force, MMLs) that cover either possession only or possession and use of DU. The NRC licenses the DU present on active military test, research, and training ranges. A majority of these licenses are managed by the NRC's Regional Offices.

### Commitments Made During the Licensing of the Davy Crockett Spent DU Munitions

In 2007, the Army discovered unlicensed DU in the Davy Crockett M101 Spotting Rounds that were present on one range on the Island of Oahu and four ranges on the Island of Hawaii. The manufacture, storage, testing, and distribution of these rounds was conducted under Atomic Energy Commission regulatory oversight from the 1940s through the 1970s and NRC regulatory oversight in the late 1970s. Historically, these munitions were not accounted for after they had been used on ranges. The Army did not remove or clean up these spent rounds on the range. As a result of further evaluation of its ranges, the Army identified additional ranges containing spent DU rounds. Based on the Army's possession of spent DU munitions at these ranges, the NRC requested that the Army apply for a source material license for possession of the DU material. Source Materials License SUC-1593 was subsequently issued to the Department of the Army in 2013. The licensing of the first two sites identified with Davy Crockett DU munitions took approximately six years. The licensing of the remaining fifteen sites, using a programmatic approach that streamlined the licensing process, took approximately two additional years to complete<sup>2</sup>.

During the initial licensing action for the Davy Crockett munitions, the NRC staff realized that similar spent DU munitions from other weapon systems could be present on military ranges and not under NRC regulatory oversight. The NRC staff determined that, after completion of the licensing of all the Davy Crockett DU, the NRC would assess if DU munitions from other weapon systems were present on military ranges. Based on these findings, the NRC would determine if further actions were necessary. During a public meeting with stakeholders in 2013 (ADAMS Accession No. ML13352A214), the NRC committed to evaluate the potential for the presence of other (non-Davy Crockett) spent DU munitions on the Hawaiian military installations.

---

<sup>2</sup> License SUC-1593 initially only included two sites and has been amended to include the remaining Army sites.

Since the Davy Crockett spent DU munitions license amendment was completed in March 2016 to add 15 additional sites, there have been several inquiries from the public about the status of licensing for DU in specific calibers of spent rounds in military training applications and associated inquiries regarding the adequacy of protection of public health and safety. While the NRC's findings regarding the Davy Crockett DU licensed under SUC-1593 indicates that the presence of DU is not an immediate safety concern, this implementation plan aims to address those inquiries and ensure that DU at firing ranges is under appropriate regulatory control.

## **Implementation Plan Steps**

This section of the implementation plan describes the overall strategy to ensure that DU located on active or inactive military ranges is under the NRC's regulatory oversight. This section identifies and describes the three steps of the plan, the associated implementation schedule, and milestones for completion of each step. The starting time, T = 0, represents the initiation of the plan once it is approved and the resources are made available. Before initiating Step 1, the Office of Nuclear Material Safety and Safeguards (NMSS) staff will develop a communication plan with concurrence from appropriate NRC stakeholders.

### **STEP 1: Identify Ranges Containing DU** T = 0 - 18 months

Step 1(a), Discuss the DU Implementation Plan with the Navy, Air Force, and Army

The NRC staff will hold meetings with the Navy, Air Force, and Army to ensure a common understanding of DU on ranges. At the initial meetings, the NRC staff will introduce the DU implementation plan to the Navy, Air Force, and Army. This may be accomplished through multiple venues. For example, it could be introduced to the Navy and Air Force at the annual MML counterpart meeting or the quarterly radiation safety committee meetings where the NRC is encouraged to provide pertinent licensing information. Similar meetings will be established with the Department of the Army/Army Licensees Points of Contact (POC) on a periodic basis. NRC headquarters staff will lead these discussions, while ensuring appropriate coordination with Regional personnel. Additionally, NRC headquarters staff will be responsible for documenting the outcomes of these meetings. At these interactions, the NRC staff will discuss the NRC's responsibilities and authorities as well as licensees' responsibilities (environmental monitoring, safety, control, etc.). These discussions are expected to be part of a collaborative effort between the NRC and DoD to ensure appropriate regulatory oversight of DU. NRC staff will make adjustments to this plan based on feedback received from the military. These discussions will be documented in phone call summaries, emails, or letters.

Step 1(b), Identify Unlicensed Ranges that Contain DU and are Subject to the NRC/DoD MOU

As dictated under the NRC/DoD MOU, every November, the DoD develops an annual inventory list that identifies all unlicensed sites with confirmed contamination, including DU, where the DoD is conducting Defense Environmental Restoration Program (DERP) response actions. This list does not include sites that the military is not intending to clean up or sites where contamination is suspected but not confirmed.

The NMSS and Regional Office staff will review the DoD's list of sites undergoing remediation under DERP to identify the unlicensed active and inactive military ranges with DU and prepare a list of these sites. The work will be distributed to NMSS and Regional Offices consistent with the project management procedures (ADAMS Accession No. ML15090A583) associated with the NRC/DoD MOU (i.e., NMSS staff will lead coordination efforts), and each organization will share the pertinent information with NMSS for inclusion under Step 2. It is important to note that all shutdown DoD ranges undergo a preliminary assessment and site inspection as the first step in the DERP process, which should identify any sites with DU prior to transfer of the land to the public.

#### Step 1(c), Identify Licensed Ranges that Contain DU (Concurrent with Step 1(b))

The NRC Regional licensing personnel for the Army specific licenses and the Project Managers for the Navy MML and Air Force MML will review the current source materials licenses and MMLs to identify active and inactive military ranges with DU of any kind (spent munitions, armor, other) in consideration of the items in Table A-1 within Attachment 1, and identify whether any information on the DU (form, location, or quantity) is missing. Based on the information from Step 1(a), if license information about DU is incomplete (e.g., a license authorizes possession of DU but the license does not provide information about the form, location, quantity, etc.), then this missing information will be requested from the Navy, Air Force, or Army and added to the license. Additionally, NRC headquarters personnel will consider available historical NRC information, such as previous programmatic documents, that may assist in the identification of DU at ranges. A list of these sites will be prepared by the NRC Regional licensing personnel for the Army specific licenses and the Project Managers for the Navy MML and Air Force MML. Active or inactive sites that have been previously remediated or dispositioned under the auspices of the NRC will not be included in the list. The responsible NRC organizations that are assigned these licenses will share the pertinent information with NMSS for evaluation under Step 2.

### **STEP 2:        Identify the Licensing Status of DU on Military Ranges (after Step 1)** **T = within 12 months of completion of Steps 1(b) and 1(c)**

#### Step 2(a), Issue a Confirmation Request

The NRC will send letters to the Navy, Air Force, and Army. The letters will summarize the NRC's understanding of how licensed ranges are monitored and controlled by addressing the environmental monitoring, health and safety, and physical security programs for each site. The letters will also provide the NRC's list of active and inactive military ranges with DU (developed in Step 1). The list will not include active or inactive ranges that were previously remediated under the auspices of the NRC, as mentioned above. In each letter, the NRC will request that the Navy, Air Force, or Army (1) confirm that the provided list includes all active and inactive military ranges with DU that have not been remediated; (2) determine whether the site is authorized by an NRC license, subject to the DoD MOU, or unlicensed; and (3) for any sites not currently licensed or covered under the MOU, outline the military's current controls for protection of public health and safety.

For any ranges that are unlicensed, the DoD and NRC responsible licensing organizations will proceed to Step 3. The goal of the plan is to identify unlicensed sites that contain DU and ensure that they are under the appropriate NRC oversight, whether that be under the auspices of the MOU or through the NRC licensing process.

## Step 2(b), Confirm Response through Inspection

Oversight of unlicensed ranges will be addressed in Step 3. Follow-up inspections of newly identified unlicensed ranges will be conducted if the NRC staff determines that inspections are needed to confirm that the ranges adequately address environmental monitoring, health and safety, and physical security. These inspections will be discussed during a future Air Force MML inspection meeting, Navy MML inspection meeting, or an inspection meeting to be established with the Department of the Army/Army Licensees POC.

If, as part of this effort, NRC staff determines follow-up inspections of currently licensed ranges are necessary, those will be performed within the context of the existing inspection program. Follow-up inspections at Air Force and Navy ranges will be conducted in accordance with NRC Inspection Manual, Chapter 2810, "Master Material License Oversight and Inspection Program" [REDACTED] to confirm the adequacy of DU unlicensed ranges with regard to environmental monitoring, health and safety, and physical security. These inspections will be discussed with the Master Materials License Radiation Safety Committee and MML management during the biennial inspection. A similar effort will occur with the Department of the Army/Army Licensees POC using the guidance provided in IMC 2800 Materials Inspection Program (ML17186A204).

### **STEP 3: Regulatory Oversight of Unlicensed DU**

T = concurrent with Step 2; but no later than 30 months from start.

If any ranges are determined to be unlicensed or not currently under the NRC/DoD MOU in Step 2, the NRC staff will determine if the range should be licensed or included in the list under the MOU. The responsible licensing organization will coordinate the licensing approach and schedule for licensing Army ranges or ensure that permits are added to the MMLs for Navy and Air Force sites, as necessary.

The licensing options are: (1) issue a new license<sup>3</sup> or permit (as applicable) using a programmatic approach; (2) issue a license for each site; or (3) amend an existing license to add additional DU material from other locations. These options should be considered by the responsible licensing organization when determining a path forward, and the most efficient and effective approach will be considered on a case-by-case basis if any unlicensed sites are identified that need to be licensed.

If a site is unlicensed and not part of the NRC/DoD MOU, a licensing approach should be determined and an application should be submitted to the NRC for review. This step may involve discussions with the applicant regarding the licensing approach.

If any active or inactive military ranges with DU that should be licensed are identified, consistent with NUREG-1556, Vol. 20, Section 3.2.2, the responsibility for reviewing the license application should be assigned to the Region where the licensed activities are inspected. For multiple ranges located among more than one State,<sup>4</sup> the Regional Offices should decide on a case-by-

---

<sup>3</sup> A Master Materials License is considered a license and a new permit may be issued under the MML. New Licensees may be applicable to other Department of Army installations other than those with Davy Crockett DU.

<sup>4</sup> Note: For the licensing of the Davy Crockett DU M101 spent munitions (SUC-1593), due to the complexity of the licensing action, it was decided that the licensing review was to be conducted by NMSS. Upon issuance of License Amendment 3, the responsibility for managing the license was transferred to

case basis how the Regional Offices will manage the licensing review and inspection responsibilities upon licensing.

To ensure ongoing consistency in the licensing approach across programs and Regions, NMSS will work with the Regional Offices to:

- Establish the criteria and license conditions that the NRC expects the Navy and Air Force MMLs to follow for permitting or licensing the locations for the identified radioactive materials.
- Modify the Letters of Understanding (LOU) for the Navy and Air Force MMLs to incorporate the guidance for permitting these types of source material licenses.
- Establish a working group to generate the criteria for the Regional Offices to license the sites for the Army to ensure there is a consistent approach between the Regions. This may include consideration of a programmatic approach across regional boundaries, amending existing licenses, or amending NRC License SUC-1593, which has already established an environmental monitoring program at a number of ranges, to include non-Davy Crockett DU.

## Resources

[REDACTED]

[REDACTED]

## References

[AEA] Atomic Energy Act of 1954, as amended, 42 U.S.C. § 2011 et seq., Pub. L. 83-703.

[GAO 2000] Government Accountability Office Report, GAO/NSAID-00-70, "Gulf War Illnesses, Understanding Health Effects from Depleted Uranium Evolving but Safety Training Needed," March 2000.

[OSAGWI 1998] Office of the Special Assistant for Gulf War Illness (OSAGWI) 1998 Environmental exposure report, "Depleted Uranium in the Gulf Interim Report."

[NRC 1987] "Standard Review Plan for Applications for Source Material Licenses", December 1987 (ADAMS Accession No. ML17100A285).

[NRC 1998a] "Commission Staff Requirements Memorandum (SRM) - SECY-98-201 – Deferral of Regulatory Oversight of Certain Portions of the Lake City Army Ammunition Plant to the U.S. Environmental Protection Agency," dated October 15, 1998 (ADAMS Accession No. ML003755439).

---

the Regional Offices. If unlicensed DU is identified during the implementation of this plan that should be licensed, the responsible Regional Office, as Lead, will consult with NMSS, as necessary, especially if the licensing action is complex covering multiple sites and States.

[NRC 2000] "Consolidated Guidance About Materials Licenses: Guidance about Administrative Licensing Procedures," Final Report (NUREG-1556, Volume 20), published December 2000.

[NRC 2001] SRM-SECY-01-0088 - "Deferral of Regulatory Oversight of Area 10 (The Sand Pile) of Lake City Army Ammunition Plant to EPA & Request to Remove Site from Site Decommissioning Management Plan", June 13, 2001 (ADAMS Accession No. ML011650107).

[NRC 2003b] NUREG-1748, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs" July 2003 (ADAMS Accession No. ML032450279).

[NRC 2011] "August 2011 Lake City Army Ammunition Plant Area 10 Sand Remediation Project Summary," dated August 22, 2010 (ADAMS Accession No. ML11280A336).

[NRC 2012] "NRC Inspection Manual, Chapter 2810, Master Material License Oversight and Inspection Program," dated October 11, 2012 (ADAMS Accession No. ML12180A017).

[NRC 2013a] "Guidance for Implementation of the Final Rule "Distribution of Source Material to Exempt Persons and to General Licensee and Revision of General License and Exemptions" 10 CFR Parts 30, 40, 70, 170, and 171," dated May 29, 2013 (ADAMS Accession No. ML13051A824).

[NRC 2013b] "Safety Evaluation Report for the U.S. Army's Possession License for Depleted Uranium from the M101 Spotting Round", October 23, 2013 (ADAMS Accession No. ML13259A081).

[NRC 2014] December 12, 2103 Meeting Summary Regarding the U.S. Army License for Depleted Uranium, dated January 6, 2014. (ADAMS Accession No. ML13352A214).

[NRC 2015a] *Davy Crockett - Depleted Uranium – Possession Only License Source Materials License No. SUC- 1593 Additional Guidance*, February 27, 2015 (ADAMS Accession No. ML15061A177).

[NRC 2015b] *Davy Crockett - Depleted Uranium – Possession Only License Source Materials License No. SUC- 1593 Additional Guidance*," dated on February 27, 2015, ADAMS Accession No. ML15061A177

[NRC, 2016a] "Consolidated Guidance About Materials Licenses: Program-Specific Guidance about Master Materials Licenses," Final Report (NUREG-1556, Volume 10, Revision 1), published June 2016.

[NRC, 2016b] Letter to All Agreement States and Non-Agreement States from NRC on The NRC Memorandum of Understanding with the U.S. Department of Defense Regarding Remediation of Unlicensed Radioactive Material (STC-16-072), dated August 26, 2016 ADAMS Accession No. ML16125A461.

[NRC and DoD, 2016], "A Memorandum of Understanding (MOU) for Coordination on Comprehensive CERCLA Response Actions at DoD Sites with Radioactive Materials", ADAMS Accession No. ML16092A294).

[USACE 2011] St Louis. Project Archive Search Report. Use of Cartridge, 20mm Spotting

M101. St Louis, Missouri: US Army Corps of Engineers, St Louis District, 2011.

[USARMY 2007] AR 200-4, "Environmental Protection and Enhancement," December 13, 2007  
([http://www.apd.army.mil/pdf/AR200-4\\_1.pdf](http://www.apd.army.mil/pdf/AR200-4_1.pdf))

## ATTACHMENT 1, INFORMATION FOR NRC STAFF CONSIDERATION DURING PLAN IMPLEMENTATION

### Publicly Available Documents that Identify Weapon Systems that Use DU Munitions

Through a review of the Office of the Special Assistant for Gulf War Illnesses (OSAGWI) 1998 Environmental exposure report, "Depleted Uranium (DU) in the Gulf Interim Report," and the Government Accountability Office Report, GAO/NSAID-00-70, "Gulf War Illnesses, Understanding Health Effects from Depleted Uranium Evolving but Safety Training Needed," March 2000, the U.S. Nuclear Regulatory Commission (NRC) staff is aware that the military has used multiple weapon systems that use DU munitions. The following table was derived from the OSAGWI report and identifies weapon systems that use munitions that contain DU.

**Table A-1, Known Weapon Systems that Use Munitions that Contain DU (Publicly Available)**

U.S Army: <ul style="list-style-type: none"><li>• Davy Crockett M101 Spotting Rounds</li><li>• Kinetic cartridges for the 25mm BUSHMASTER cannon (M2/3 Bradley Fighting Vehicle),</li><li>• 105mm cannon (M1 and M60 series tanks)</li><li>• 120mm cannon (M1A1 and M1A2 Abrams Tank)</li><li>• Army Special Forces also use small caliber DU ammunition on a limited basis.</li></ul>
U.S. Marines <ul style="list-style-type: none"><li>• The Marines use DU tank rounds in their own M1-series tanks as well as a 25mm DU round in the GAU-12 Gatling gun on Marine AV-8 Harriers.</li></ul>
U.S Navy <ul style="list-style-type: none"><li>• The 20mm DU round developed by the Navy for use in its shipboard PHALANX Close In Weapons System (CIWS) remains in service; however, since FY 1990, the Navy has procured only tungsten rounds for the CIWS. The 20mm DU rounds remaining in the inventory will be used until the supply is exhausted or ages beyond its service life.<sup>1</sup></li></ul>
US Air Force <ul style="list-style-type: none"><li>• The Air Force uses a 30mm DU round in the GAU-8 Gatling gun on the A-10.</li></ul>

The OSAGWI report briefly mentions that the material is licensed by the NRC, but it does not identify the licenses and does not provide details such as the scope of the licenses. If the military is fielding or has deployed these weapon systems, it is reasonable to assume that training exercises were or are being conducted with these weapon systems on military training ranges. The NRC staff believes that it is possible that these weapons systems were fired in training ranges and that it is appropriate to verify that appropriate regulatory controls are in place.

---

<sup>1</sup> Letter to the Office of the Special Assistant for Gulf War Illnesses from the Commander, Crane Division, Naval Surface Warfare Center, "Navy/Marine Corps Responses to Questions on Depleted Uranium Ammunition" (March 17, 1998), Enclosure 1, p. 1.

## **Mechanism for Monitoring Certain DoD Unlicensed DU on Military Ranges**

The NRC entered into a Memorandum of Understanding (MOU) with the U.S. Department of Defense (DoD) on April 28, 2016, (ADAMS Accession No. ML16092A294). This MOU was issued for coordination on Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. 9601 et seq., as amended (CERCLA)/Defense Environmental Restoration Program, 10 U.S.C. 2700 et seq., as amended (DERP) Response Actions (clean-up) at DoD Sites with radioactive materials. This MOU is intended to address radioactive materials that are being remediated at DoD sites that are not presently under an NRC license, although the material is licensable under the Atomic Energy Act of 1954, as amended (AEA). The MOU requires the DoD to provide an annual inventory list of all DoD sites at which DoD is conducting CERCLA/DERP response actions that are within the scope of the MOU. Ranges with unlicensed material that the military plans to continue to use for military operations would not appear on this annual list. The MOU only addresses unlicensed radioactive material that is or may be subject to regulation under the AEA that DoD is remediating under DERP. Details on the scope are specifically identified in Provisions 9, 10 and 11 of the MOU.

As part of the DoD's obligation under the MOU, the DoD provided the NRC with its updated annual list of sites (for 2019) that have radioactive materials that are currently being cleaned-up or remediated under the CERCLA/DERP process (ADAMS Accession No. ML18332A034). This list also identified the radionuclides present and a brief description of the action that the DoD is undertaking. Implementation of the MOU requires an annual update to be submitted to the NRC by November 30<sup>th</sup> of each year. The annual list does not specify the actual estimated amounts or form of radioactive materials at each site, or whether the material was ever authorized under a NRC license. In cases where DU is identified, the source is not specified (e.g., spent rounds from a weapon system or armor).

## **Guidance Specific to DU on Military Ranges**

There is no single NRC guidance document for review of licenses for activities that may result in the release of dispersible source material in the environment, such as spent DU rounds, DU metal, or DU oxides. For the safety evaluation report (SER) for the licensing of Davy Crockett DU M101 Spotting Rounds (ADAMS Accession No. ML16039A225 [Pkg.]), NRC Source Materials License No. SUC-1593), the NRC staff reviewed the license application using 10 CFR Part 40, "Domestic Licensing of Source Material" and the applicable guidance in NUREG-1556, Vol. 7, "Consolidated Guidance About Materials Licenses: Program-Specific Guidance About Academic, Research and Development, and Other Licenses of Limited Scope Including Gas Chromatographs and X-Ray Fluorescence Analyzers."

NUREG-1556, Vol. 7 was developed for academic, research and development, and other byproduct material licenses of limited scope under Part 30. Although this guidance does not specifically apply to source material (Part 40) licenses, the staff used it to review the Davy Crockett DU that is present on active Army ranges, because it addresses Part 20 radiological protection requirements for Part 30 byproduct materials licensees, which are the same as the Part 20 requirements for Part 40 licenses.

The NRC staff also use "Standard Review Plan for Applications for Source Material Licenses," dated December 1987 (ADAMS Accession No. ML17100A285).

License reviewers leverage relevant Regulatory Guides (RG) such as RG 4.14, "Radiological Effluent and Environmental Monitoring at Uranium Mills"; RG 8.11, "Applications of Bioassay for

Uranium”; RG 8.30, “Health Physics Surveys in Uranium Recovery Facilities”; RG 8.31, “Information Relevant to Ensuring that Occupational Radiation Exposures at Uranium Recovery Facilities Will be as Low as is Reasonably Achievable”; and RG 10.4, “Guide for the Preparation of Applications for Licenses to Process Source Material”. These guidance documents, however, are not specific to DU that remains on ranges.

In addition to the guidance documents above, the following guidance has been used for the licensing and oversight of DU. These guidance documents are applicable even though they do not specifically identify DU in the form of spent rounds. They are being presented below for completeness.

- Guidance for general licenses and exemptions applicable to Part 40 is found in “Guidance for Implementation of the Final Rule ‘Distribution of Source Material to Exempt Persons and to General Licensee and Revision of General License and Exemptions’ 10 CFR Parts 30, 40, 70, 170, and 171,” dated May 29, 2013 (ADAMS Accession No. ML13051A824). Three of the Davy Crockett sites located at Fort Carson, Colorado, are now regulated under a general license, because the amount of DU present on each site met the criteria under 10 CFR 40.22 for small quantities of source material, which is covered by a general license.
- The NRC staff consults with other agencies regarding the proposed action in accordance with NUREG-1748, “Environmental Review Guidance for Licensing Actions Associated with NMSS Programs.” These consultations are intended to: (i) ensure that the requirements of Section 7 of the Endangered Species Act of 1973, and Section 106 of the National Historic Preservation Act of 1966,<sup>2</sup> are met, and (ii) provide the State with the opportunity to comment on the proposed action.
- The Division of Nuclear Materials Safety (DNMS) inspectors in the Regional Offices follow the NRC Inspection Manual when inspecting source material activities, including those of the military. In particular, the following guidance is used: Manual Chapter 2800, “Materials Inspection Program”; Inspection Procedure (IP) 87102, “Maintaining Effluents from Materials Facilities As Low As Is Reasonably Achievable (ALARA); IP 87125, “Materials Processor/Manufacturing Programs”; IP 87126, “Industrial/ Academic/ Research Programs”; and IP 87129, “Master Materials Programs.” Inspectors review the implementation of commitments made during the licensing process, as well as compliance with applicable regulations in 10 CFR Parts 20 and 40.

---

<sup>2</sup> 16 USC 470 et seq.

## **ATTACHMENT 2, CURRENT SOURCE MATERIAL LICENSES FOR DEPLETED URANIUM**

### **U.S. Army:**

1. SUC-1593, Davy Crockett M101 Spotting Rounds, Army Installation Management Command (AIMC), Possession Only of historical inventory of DU spent rounds used in training and testing applications, no soil disturbance for removal of incident clean-up of rounds. No inventory control management (historical spent rounds). Currently managed by Headquarters.
2. SUB-1435, Jefferson Proving Ground, AIMC, Possession only/decommissioning Primary Program Code (PPC) 11800. Managed by Headquarters.
3. STB-1579, Army Aviation and Missile Command (AAMC), Redstone Arsenal and Fort Rucker, AL, Source material > 150Kg, Managed by RI.
4. STB-1554, U.S. Army Tank-Automotive and Armaments Command (TACOM), Watervliet Arsenal, Watervliet, NY, Source material <150Kg, Managed by RI.
5. SUB-834, Army Test Command, Aberdeen Proving Ground (APG), MD, PPC 11221, outdoor testing of munitions. Managed by RI.
6. SMB-141, Army Research, Development, and Engineering Command (ARDEC), Army Research Lab, Army Research Laboratory, APG, MD, PPC 11221, outdoor testing of munitions. Managed by RI.
7. SUB-734, Army Development Test Command, White Sands Missile Range, NM, PPC 11220, indoor testing of munitions. Managed by RIV.
8. SMB-1411, ATEC, Yuma Proving Grounds, Yuma, AZ, PPC 11221, outdoor testing of munitions. Managed by RIV.
9. SMB-707, Army Public Health Command, APG, Aberdeen, MD, PPC 11300, Source Material greater than 150 kg. Managed by RI.
10. SUB-348, ARDEC, Picatinny Arsenal, NJ, PPC11300, Source Material greater than 150 kg. Managed by RI.
11. SUB-1536, TACOM, Warren, MI, PPC 11300, Source Material greater than 150 kg. Managed by RIII.
12. SUB-1602, Army Joint Munitions Command (AJMC), Anniston Army Depot, Anniston, AL, Anniston, PPC 11210, Source Material as shielding. Managed by RI.
13. SUC-1380, AJMC, Rock Island, IL responsible for parts of Lake City Arsenal, Independence, Missouri, not being managed under CERCLA (docket 04008767) Redstone Arsenal, PPC 11300, Source Material greater than 150 kg. Managed by RIII.

### **U.S. Navy and U.S. Marines**

14. 45-23645-01NA, U.S. Navy Master Materials License. Managed by Region I.

- Permit 13-00164-L1NP
- Permit 04-60530-L1NP, China Lake

### **U.S. Air Force**

15. 42-23539-01AF, U.S. Air Force Master Materials License. Managed by Region IV.

- Permit FL-00781-00/00AFP, Eglin AFB
- Permit UT-00793-00/00 AFP, Hill AFB
- Permit NV-00780-00/00 AFP, Nellis AFB

**ATTACHMENT 3, RESOURCE ANALYSIS**

[REDACTED]

Assumptions:

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

**Step 2, Identify the Licensing Status of DU on Military Ranges: Step 2(a), Issue a Confirmation Request; and Step 2(b), Confirm Response through Inspection**

[REDACTED]

[Redacted]

[Redacted]

**Step 3, Regulatory Oversight of Unlicensed DU, as Needed**

[Redacted]