SAFETY EVALUATION REPORT Source Materials License No. SUC-1593

Depleted Uranium from Davy Crockett M101 Spotting Rounds – Amendment No. 3

Docket No. 040-09083 U.S. Army Installation Management Command ADAMS Accession No. ML18158A324

U.S. Nuclear Regulatory Commission

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Introduction

In a letter (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17158B356) dated June 1, 2017, the U.S. Army Installation Management Command (the Army or the Licensee) requested an amendment to Source Materials License No. SUC-1593 (the License) to replace the three annexes to the programmatic environmental monitoring plan (ERMP) (site-specific ERMPs) with revised final versions, because the Army indicated that Figure 1.2, in each site-specific ERMP in question, is incorrect due sizing/scaling errors. The specific site-specific ERMPs that the Army proposes to replaced are the:

- "Site-Specific Environmental Radiation Monitoring Plan Fort Polk Louisiana (LA) Annex 11," dated September 2016,
- "Site-Specific Environmental Radiation Monitoring Plan Fort Riley, Kansas (KS) Annex 12," dated September 2016, and the
- "Site-Specific Environmental Radiation Monitoring Plan Pohakuloa Training Area, Hawaii (HI) Annex 17," dated September 2016.

In addition, in its June 1, 2017, letter, the Army requested, for the purpose of efficiency, that the license be amended to allow the Army to make future changes to correct similar "minor errors" in site-specific ERMPs without submittal of a license amendment request. The U.S. Nuclear Regulatory Commission (NRC) staff (staff) acknowledged receipt of the amendment request in a letter (ADAMS Accession No. ML17160A091), dated June 17, 2017.

In a letter dated September 18, 2017 (ADAMS Accession No. ML17226A205), the NRC staff (staff) informed the Army that they completed their acceptance review of the application and found that the request to correct specific figure sizing/scaling errors in the identified site-specific ERMPs contains sufficient information for the staff to begin their detailed technical review. However, the staff determined that the Army's proposal to make similar future "minor changes" to site-specific ERMPs without NRC approval did not contain enough information to accept the request for detailed technical review. Also, in the September 18, 2017, letter, the staff informed the Army that they would continue to process the June 1, 2017, license amendment request, to include the appropriate noticing in the Federal Register, without further consideration of the "minor changes" portion of the license amendment request if the Army did not provide a supplement to the amendment request within 30 days for the staff to evaluate.

On October 18, 2017, the Army informed the staff that it would not pursue the minor changes portion of its June 1, 2017 amendment request. In a letter dated November 21, 2017 (ADAMS Accession No. ML17297B156), the staff informed the Army that the NRC will not consider the "minor changes" portion of the Army's June 1, 2017, amendment application.

On December 11, 2017, a notice of an opportunity to request a hearing and to petition for leave to intervene on this licensing proceeding was published in the *Federal Register* (82 FR 58221). No requests were submitted.

On December 15, 2017, the Army submitted supplemental information (ADAMS Accession No. ML18009A456) clarifying how it conducts sediment sample collection. This submittal was a voluntary response to a NRC Petition Review Board's question about composite sediment sample collection associated with the March 16, 2017, 10 CFR 2.206 petition (ADAMS Accession No. ML17110A308). In a letter (ADAMS Accession No. ML18023A991) dated January 19, 2018, the Army requested that its December 15, 2017, letter be included under License Condition No. 11 for License Amendment No. 3.

Also, the staff requested that the License Radiation Safety Officer (RSO) contact information be incorporated by reference in the license consistent with NUREG-1556 Vol. 7, Rev.1 "Consolidated Guidance About Material Licenses: Program Specific Guidance About Academic, Research and Development, and Other Licenses of Limited Scope, Including Electron Capture Devices and X-Ray Fluorescence Analyzers" guidance and past practice for material licensees managed by regional staff. In addition, in a letter dated September 5, 2018 (ADAMS Accession No. ML18262A211), the Army informed the staff of the appointment of a new Army Installation Management Command Commander. This position is the new authorizing official for this license. This portion of License Amendment No. 3 is administrative.

Because the staff considered the amendment an action related to the possession and management of DU military munitions, change in licensing official and License RSO, and administrative changes, the proceeding was considered to fall within the Categorical Exclusions under 10 CFR 51.22(c)(14)(xv), 10 CFR 51.22(c)(10(iv)), and 10 CFR 51.22(c)(10)(v), respectively.

Regulatory Requirements and Guidance

This safety evaluation report (SER) summarizes the staff's review of the June 1, 2017, request to amend Source Materials License No. SUC-1593. The staff conducted its review in accordance with the applicable requirements of 10 CFR Part 40, "Domestic Licensing of Source Material," 10 CFR Part 20, "Standards for Protection Against Radiation," and the applicable requirements of the approved programmatic ERMP and applicable approved site-specific ERMPs (those for Fort Polk, LA, Fort Riley, KS, and the PTA, HI).

Summary of the Staff's Findings

The staff find that the Army's survey programs, as required by 10 CFR 20, Subpart F, "Surveys and Monitoring," as proposed to be modified by the June 1, 2017 application, would result in a change of sediment and surface water sampling locations at Fort Polk, LA and Fort Riley, KS and a change in the sediment sampling location at the PTA, HI. The staff find that these changes are reasonable under the circumstances to evaluate the magnitude and extent of radiation levels, the concentrations or quantities of residual radioactivity, and the potential radiological hazards of the radiation levels and residual radioactivity detected at these installations. The staff reviewed the proposed figures (Figure 1.2 for Fort Polk, LA, Fort Riley, KS and the PTA, HI, respectively) and found that the proposed changes in sediment and

surface water sampling locations, as applicable, are acceptable because these proposed sediment and surface water sampling locations met the sediment and surface water sampling citing criteria required by the programmatic ERMP and the corresponding site-specific ERMP. The staff find that the proposed revised final site-specific ERMPs are consistent with the previously approved programmatic approach for preparation of site-specific ERMPs pursuant to Source Materials License No. SUC-1593, Amendment No. 1.

Specifically, the change in sediment sampling and surface water sampling locations for Fort Polk, LA and Fort Riley, KS are acceptable because the proposed locations are co-located, outside the Radiation Control Areas (RCAs), down gradient of the RCAs, and are in permanent stream beds that flow from the RCAs. The sediment sampling location for the PTA is acceptable because the proposed location is outside the RCAs, down gradient of the RCAs and in the direction of intermittent flow path away from the RCAs (as determined by the staff's review using ArcGIS). Further, the staff found through evaluation that the lava flows in the vicinity of the PTA, HI RCAs (those that transect the RCA area) do not act as an impenetrable barrier to surface water flow towards the general direction of the sediment sample location.

Also, the staff find that the proposed changes do not impact the dose assessment verification, because the bounding public dose assessment was not impacted due to change of sampling locations at the identified facilities. The staff find that the proposed three revised final site-specific ERMPs are adequate for monitoring for transport of DU from the radiation control areas or ranges where the Davy Crockett DU is located.

The staff determined that the December 15, 2017, clarifying information about sediment sample collection in the letter does not involve any new actions needing NRC approval and that the clarifying information would not modify the current requirements and commitments. The staff conclude that the December 15, 2017, clarifying letter should be incorporated by reference in License Condition No. 11 for transparency. This portion of the License Amendment No. 3 is administrative.

The staff also determined that incorporation by reference in License Condition No. 11 of the contact information of the License RSO would not affect what was already approved in previous licensing actions and the information would not impact the meaning of current requirements and commitments. The staff conclude that the contact information for the License RSO should be incorporated by reference in License Condition No. 11 for transparency. This portion of the License Amendment No. 3 is administrative.

Other changes that should be made to the License were identified by the staff during the course of their review. These changes would consist of modification of sentences to ensure consistent use of acronyms and initialism or proper formatting, or are correcting grammatical or typographical errors. The staff confirmed that these changes would not change any requirements or commitments or add new requirements or commitments.

The staff conclude that the findings described in the succeeding sections of this SER support

the issuance of a license amendment requiring the use of the three revised final site-specific ERMPs and incorporating them by reference in License Condition No. 11. Also the staff conclude that the findings in the succeeding section of the SER support the issuance of a license amendment that incorporates by reference the December 15, 2017, letter clarifying sediment sample collection and the February 24, 2010, letter documenting the contact information for the License RSO. The title and ADAMS Accession No. reference numbers of the documents that will be incorporated by reference in License Condition No. 11 are listed below:

ADAMS	Title
Accession No.	
ML17158B356	Revised Final Site-Specific Environmental Radiation Monitoring Plan,
	Fort Polk, Louisiana, Annex 11, dated May 2017.
ML17158B356	Revised Final Site-Specific Environmental Radiation Monitoring Plan,
	Fort Riley, Kansas, Annex 12, dated May 2017.
ML17158B356	Revised Final Site-Specific Environmental Radiation Monitoring Plan,
	Pohakuloa Training Area, Hawaii, Annex 17, dated April 2017.
ML18009A456	Letter dated December 15, 2017, clarifying sediment sampling collection.
ML120950352	Letter dated February 24, 2010, documenting the contact information for the
	License RSO for this license.
ML18262A211	Letter dated September 5, 2018, documenting the new licensing official for this
	license.

The staff find that the requested license amendment is in accordance with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), as well as the NRC's rules and regulations.

Background

Source Materials License No. SUC-1593 (ADAMS Accession No. ML16343A164) applies to active Army ranges (sites) that have depleted uranium (DU) from Davy Crockett M101 spotting rounds. These sites are located at: Donnelly Training Area, Fort Wainwright, Alaska; Fort Benning, Georgia (GA); Fort Bragg, North Carolina; Fort Campbell, Kentucky (KY); Fort Carson, Colorado; Fort Gordon, GA; Fort Hood, Texas; Fort Hunter Liggett, California; Fort Jackson, South Carolina; Fort Knox, KY; Fort Polk, LA; Fort Riley, KS; Fort Sill, Oklahoma; Joint Base Lewis-McChord/Yakima Training Center, Washington; Joint Base McGuire-Dix-Lakehurst, New Jersey; and Schofield Barracks/PTA, HI. Background information on the Davy Crockett DU M101 spotting rounds can be found in the SER for License Amendment No. 1 (ADAMS Accession No. ML16039A230).

By the issuance of License Amendment No. 1 to Source Materials License No. SUC-1593, the NRC approved the programmatic ERMP (ADAMS Accession No. ML16004A369). The programmatic ERMP guides the development of site-specific ERMPs for each installation or joint installations to address all RCAs licensed under Source Materials License No. SUC-1593 and recognized any environmental monitoring within an active range poses undue risk caused

by unexploded ordinance. As such, the site-specific ERMPs primarily focus on surface water bodies and sediments which may contain or accumulate residual DU due to runoff and transport outside of the active range areas/RCAs. Pursuant to License Condition No. 17, if evaluations of environmental sampling data indicate that DU is present (as determined by an isotopic activity ratio for uranium-238/uranium-234 of three or greater), then the Army would notify the NRC within 30 days and collect additional environmental samples within an additional 30 days of the notification. Furthermore, each site-specific ERMP includes figures showing the RCAs, predominant direction of surface water flow, and any wells in the vicinity as well as the proposed surface water and sediment sampling locations. Each site-specific ERMP also contains the contingent commitment for soil sampling if the Army discovers significant discernable soil erosion, transport, or deposition. The Army committed, in its application for Amendment No. 2, that sample sediment, surface soil, and groundwater would be collected under the conditions it describes in its programmatic ERMP and as prescribed in each applicable site-specific ERMP. Each site-specific ERMP contains prescribed general methods for sample collection and sample analysis. Also included, as Annex 19 to the programmatic ERMP, is the "Programmatic Uniform Federal Policy-Quality Assurance Project Plan (UFP-QAPP)." Annex 19 is applicable to all sitespecific ERMPs.

Safety Evaluation

1.0 Figures 1.2 in the Revised Final Site-Specific Environmental Monitoring Plans for Fort Polk, Louisanna, Fort Riley, Kansas, and the Pohakuloa Training Area, Hawaii

1.1 Regulations and Guidance

Title 10 CFR, Part 20, Subpart F – Surveys and Monitoring, Section 20.1501(a) states that each licensee shall make, or cause to be made, surveys of areas that are reasonable under the circumstances to evaluate the magnitude and extent of radiation levels, concentrations or quantities of residual radioactivity, and the potential radiological hazards. The regulation at 10 CFR 20.1301 establishes public dose limits which are applicable in this instance. The regulations in Part 20 apply to Part 40 Licensees.

The programmatic ERMP was approved through issuance of License Amendment No. 1 and each site-specific ERMP was approved through issuance of License Amendment No. 2. Requirements specific to sediment sampling are found in Section 5.m. of the programmatic ERMP and Sections 2.1 and 3.2 of each site-specific ERMP. Requirements specific to surface water sampling are found in Section 5.f. of the programmatic ERMP and Sections 2.1 and 3.1 of each site-specific ERMP. Section 3.1 of the site-specific ERMPs for Fort Polk and Fort Riley describe specific locations where surface water and sediment samples will be collected outside of the RCAs and these locations are clearly identified on Figure 1.2 of each installation's site-specific ERMP, as locations for "surface water & sediment sampling locations." In addition, Section 3.2 of the site-specific ERMPs for Fort Polk, LA and Fort Riley, KS state that the

collection of sediment samples will coincide with surface water sampling activities and will be collected from various areas along the stream bed. Section 3.2 of the site-specific ERMP for the PTA state that no surface water will be collected. Figure 1.2 of each site-specific ERMP, shows the location of each RCA, sediment and surface water sampling locations, as applicable, topography, direction of water flow, and RCA boundaries, among other things, such as map scale, compass direction, and latitude and longitude positions.

1.2 Submittals

In a letter (ADAMS Accession No. ML17158B356) dated June 1, 2017, the Army requested an amendment to Source Materials License No. SUC-1593 to replace three site-specific ERMPs that are incorporated by reference in the License, because the Army indicated that Figure 1.2, in each of these three site-specific ERMPs, is incorrect due errors it made in sizing/scaling. The Army stated that no other changes were made to these site-specific ERMPs. The site-specific ERMPsthat the Army identified to be replaced with the revised final versions with corrected figures are the:

- "Site-Specific Environmental Radiation Monitoring Plan For Polk Louisiana Annex 11", dated September 2016,
- "Site-Specific Environmental Radiation Monitoring Plan Fort Riley, Kansas Annex 12," dated September 2016, and the
- "Site-Specific Environmental Radiation Monitoring Plan Pohakuloa Training Area, Hawaii Annex 17," dated September 2016.

The Army's proposal to make similar future "minor changes" to site-specific ERMPs without NRC approval was not evaluated by the staff, as explained earlier in this SER (Introduction Section).

In addition on December 15, 2017, the Army submitted supplemental information (ADAMS Accession No. ML18009A456) clarifying how it conducts sediment sample collection. This submittal was a voluntary response to a NRC Petition Review Board's question about composite sediment sample collection associated with the March 16, 2017, 10 CFR 2.206 petition (ADAMS Accession No. ML17110A308). In a letter dated January 19, 2018 (ADAMS Accession No. ML18023A991), the Army requested that its December 15, 2017, clarification letter be included under License Condition No. 11. The Army stated that the license would then explicitly include the following statement from the enclosure to the December 15, 2017, letter:

"The collection of the sediment sample will consist of a discrete sample at each sample location. If necessary, multiple aliquots (no more than 10) will be collected from a 1-meter radius of the sample location in order to collect the required volume from the stream bed." Also, the Army stated that the statement clarifies its sampling method, which had been an expressed concern in the 10 CFR 2.206 petition and that it prefers incorporation by reference to changing each of the first 18 site-specific ERMPs.

1.3 Staff Evaluation

Proposed Change in Certain Sediment and Surface Water Sampling Locations

The staff reviewed Figure 1.2 in each proposed revised final site-specific ERMP showing the topography of the military installation, the RCAs, direction of surface water runoff, and proposed sampling location(s). The staff find the sampling locations to be downgradient from the various RCAs and therefore adequate for tracking and trending purposes to discern if there is any significant transport of DU from the RCAs through the actions of surface water runoff.

For Fort Polk and Fort Riley, the staff compared the approved sediment and surface water sampling locations to the corresponding proposed sediment sampling and surface water locations and found that they were all closer to the RCA boundaries than before and were all outside the RCAs. For the PTA, the staff compared the approved sediment sampling location to the corresponding proposed sediment sampling. In all cases, the proposed sampling locations are closer to the RCA boundaries than before and all are outside the RCAs. The staff believe that the change in locations will likely increase the potential to identify contamination transported by surface water runoff. For the PTA, the staff note that the previously approved sediment sampling location is outside the PTA installation boundary. The staff believe that the proposed PTA sediment sampling location should be easier to sample because the new location falls within the Army's property and property use or access would not be an issue.

The staff reviewed stratigraphy maps of the RCA ranges in question (those at Fort Polk, LA, Fort Riley, KS, and the PTA, HI) and areas around the proposed sediment sampling and surface water sampling locations, as applicable, to determine if water flow was away from the RCAs and if the water flow would be impeded from flowing from the RCAs to the proposed sediment sampling locations and surface water sampling locations, as applicable. Based on the review of the change in topography, as exhibited by a continuous decrease in elevation between each of the proposed sampling location and the boundaries of the applicable RCAs, surface water hydrology, and lack of any current physical obstruction¹, the staff concluded that water flow would not be impeded.

In the staff's SER for Amendment No. 2 (ADAMS Accession No. ML16343A163), the staff concluded that the proposed site-specific ERMPs are consistent with the previously approved [Programmatic ERMP] approach for preparation of site-specific ERMPS, as well as with license conditions in Source Materials License No. SUC-1593, Amendment No. 1 (ADAMS Accession No. ML16039A234). The approach to selecting sediment sampling location(s) specified in the

¹ The RCAs are active ranges, as described in the Army's applications (Amendments No. 1 and 2).

Programmatic ERMP (ADAMS Accession No. ML16265A218) is to sample sediment in down gradient water ways that flow from the RCAs. In sites with multiple water ways, multiple sediment sampling locations are used. The approach to the selection surface water sampling location(s) specified in the programmatic ERMP is that surface water sampling should be collated with sediment sampling locations, if there is a permanent source of water flowing from the RCA(s). The staff find that the proposed revised Figure 1.2, in each revised final site-specific ERMP, is consistent with the current License requirements of the , other than a change in location of the sediment and surface water sampling location, as applicable.

The staff further contend that the Army is best suited to identify sediment and surface water sampling locations that are both reasonable and best suited for monitoring for transport of contamination from the RCAs because of unexploded ordnance. Considerations should not only include selecting a location where sediment and surface water originating from within the RCAs would most likely be deposited, but also the hazards of unexploded ordnance, to which personnel assigned to collect samples would be exposed, and the associated costs. Neither the cost nor the risk to personnel should be extensive and both should be manageable, which the staff consider is of particular concern when unexploded ordinance may be present in the area. Finally, it is noted that NRC inspection staff may inspect any aspect of the ERMP sediment and surface water sampling, as applicable, including documentation, to confirm whether the identified sampling locations are suitable based on the ERMP criteria.

The Army stated that no other changes other than Figure 1.2 were made in each of the three revised final site-specific ERMPs. The staff compared the each applicable approved site-specific ERMP to the corresponding revised final site-specific ERMP submitted to confirm that no other changes were made by the Army other than Figure 1.2.

The staff verified that the change in all sampling locations did not impact the bounding public dose assessment for each RCA, as verified during the review of License Amendment No. 2.

In the March 16, 2017, 10 CFR 2.206 petition a concern was raised that the PTA site has unique characteristics, such as "recent" lava flows, as exhibited by a vein of dark color that intersects the PTA radiation controlled area (RCAs) where the Davy Crockett depleted uranium (DU) is located, that should be taken into consideration to confirm that surface water flow is not impeded by the recent lava flow and thereby sediment collection is possible in the proposed PTA sediment sampling location designated by the Army. The concern that the sediment sampling location at the PTA site was unacceptable was not accepted by the Director of the Office of Nuclear Material Safety and Safeguards in this petition process because the staff's evaluation of the Army's request to change the sediment sampling location at the PTA was underway in which the petitioner could be a party and through which the petitioner's concerns could be addressed. The staff considered in its review for this licensing action the petitioner's comment asserting that the sediment sampling location at the PTA is inappropriate due to recent lava flows that present a formidable barrier to flow (ADAMS Accession No. ML17279A082).

The staff reviewed stratigraphy maps and aerial photographs of the PTA RCA ranges and area around the proposed sediment sampling location to determine if water flow would be impeded from flowing from the RCAs to the proposed sediment sampling location due to the current PTA topography which was partially created by past lava flows. The staff were able to identify relatively recent lava flows (within the past 750 years) located between the RCA ranges and the sediment sampling location. However, due to the slope of the terrain, these lava flows follow the same general flow direction, from the RCAs towards the sample location, of the surface water flow. The staff examined the surface runoff patterns using a United States Geological Survey digital elevation model for the site and the hydrology toolset in ArcGIS². Using ArcGIS, the staff analyzed the PTA area in question and determined the lava flows do not act as an impenetrable barrier to surface runoff. The staff found that there are places where runoff would be able to cross the lava flows and it would trend across and/or along these lava flows in the vicinity of the PTA RCAs (those that transect the RCA area) do not act as an impenetrable barrier to surface the RCA area) do not act as an impenetrable barrier to surface the RCA area) do not act as an impenetrable barrier to surface the RCA area) do not act as an impenetrable barrier to surface the RCA area) do not act as an impenetrable barrier to surface the RCA area) do not act as an impenetrable barrier to surface the RCA area) do not act as an impenetrable barrier to surface the RCA area) do not act as an impenetrable barrier to surface water flow towards the general direction of the sediment sample location.

The staff recognize that there is some inherit uncertainty in modeling surface water flow using this method and the digital model employed for the purpose. However, this modeling (ArcGIS) approach identified several possible alternate sampling locations, as noted above. The staff note that there are provisions in the programmatic ERMP (Section 3) and criteria in each site-specific ERMP (Section 2.1 and Section 3.2) that allow for adjustments to the sediment sampling, as necessary. For example, after the Army considers previous results of sampling, changing environmental conditions, and increased understanding of environmental hazards, sampling adjustments can be made if the adjustments conform to Section 2.1 and Section 3.2 in the applicable site-specific ERMP. The staff are unaware of more recent lava flows in area at the PTA where the RCAs are located that may invalidate previous analysis. Also, inspection staff may inspect any aspect of sediment sampling to include sampling location determinations and any documentation.

The PTA has a single sampling site because the staff consider the PTA to be a "dry site" with no perennial water ways flowing from the RCAs. The approved PTA ERMP and the revised final PTA ERMP state that "[D]ue to low rainfall, porous soils, and lava substrates, no perennial surface water bodies are located on, or immediately adjacent to, [PTA]. The closest known surface water body is located 4.5 miles up gradient of [PTA]. There are no perennial streams within 15 miles of [PTA], but there are intermittent streams located northeast of [PTA] and only one intermittent stream, Popoo Gulch, drains the northern portion of [PTA]. Despite occasional flow, water in the intermittent stream channels infiltrates rapidly once precipitation stops and the streams become dry." Through Amendment No. 1, the NRC approved the programmatic ERMP. The staff found that due to the small doses anticipated from environmental transport pathways, a limited environmental monitoring program is justified. The staff found that the sediment sampling strategy has not changed and the revised sediment sampling location

² ArcGIS is a platform for organizations to create, manage, share, and analyze spatial data. For more information refer to <u>https://www.esri.com/en-us/arcgis/about-arcgis/overview</u>.

remains in the general flow direction from the RCAs as confirmed by the staff's independent evaluation using GIS ArcGIS.

Proposed Administrative Changes

Incorporation by Reference Army's Rationale for Sediment Sample Collection

Based on the Army's clarification on how it collects a sediment sample (December 15, 2017, letter), the staff reconfirmed the PRB's determination (ADAMS Accession No. ML18122A089) that when the Army collects a sediment sample, dilution due to the way the samples are collected would not be a problem because taking sub-samples in one location is more representative of a single sample than a composite sample. The Army clarified in its December 15, 2017, letter that a provision for taking 10 sub-samples in one location (as specified in the approved PTA ERMP), was to ensure sufficient sample volume was collected. The staff agrees with the Army's rationale because the sub-samples are taken at one location and the resulting sample for analysis would be representative of the one location.

1.4 Findings/Conclusions

The NRC staff completed its safety evaluation (ADAMS Accession No. ML18158A324) of the license amendment request. The staff's findings are documented below:

The staff find that the proposed revised final site-specific ERMPs for Fort Polk, LA, Fort Riley, KS, and the PTA, HI, which contain the corresponding proposed revised Figures 1.2, are consistent with the previously approved programmatic approach for preparation of site-specific ERMPs pursuant to Source Materials License No. SUC-1593, Amendment No. 1. The staff find that the proposed changes do not impact the dose assessment verification because the bounding public dose assessment was not impacted due to change of sampling locations at the identified facilities. The staff find the proposed three revised final site-specific ERMPs to be adequate for monitoring for transport of DU from the RCAs or ranges where the Davy Crockett DU is located.

The staff find that the Army's survey programs, as required by 10 CFR part 20, Subpart F, Surveys and Monitoring, as proposed to be modified by the June 1, 2017 application, would result in a change of sediment and surface water sampling locations at Fort Polk and Fort Riley, and a change in the sediment sampling location at the PTA. The staff find that these changes are reasonable under the circumstances to evaluate the magnitude and extent of radiation levels; the concentrations or quantities of residual radioactivity; and the potential radiological hazards of the radiation levels and residual radioactivity detected at these installations.

The staff determined that the current lava flows in the vicinity of the PTA RCAs (those that transect the RCA area) do not act as an impenetrable barrier to surface water flow towards the general direction of the proposed sediment sample location. A copy of the staff's SER for Amendment No. 3 will be provided to the Petitioner in accordance with Management Directive

8.11, "Review Process for 10 CFR 2.206 Petitions."

The staff find the reference to the site-specific ERMPs for Fort Polk, LA, Fort Riley, KS, and the PTA, HI, should be removed from License Condition No. 11 in the Source Materials License No. SUC-1593. The proposed revised final site-specific ERMPs for Fort Polk, LA, Fort Riley, KS, and the PTA, HI, and the December 15, 2017, letter, clarifying sediment sample collection should be incorporated by reference in License Condition No. 11 instead. In addition, the staff determined that License Condition No. 18 should be modified to allow additional time from the effective date of License Amendment No. 3 for the Army to implement the revised final site-specific ERMPs for Fort Polk, LA, Fort Riley, KS, and the PTA, HI due to the change in sampling locations. The staff believe that three additional months is sufficient for this purpose. The Army agreed with the proposed license conditions (ADAMS Accession Nos. ML18158A230 and ML18158A284).

The staff determined that the December 15, 2017, clarifying information in the letter does not involve any new actions which were not already previously approved, and that the clarifying information would not modify the current requirements and commitments. The staff determined that the December 15, 2017, clarifying letter should be incorporated by reference in License Condition No. 11. This portion of the License Amendment No. 3 is administrative.

The staff determined that incorporation of the contact information of the License RSO, at the request of staff, and the new Army authorizing official for this license would not affect what was already approved in previous licensing actions and the information would not impact the current requirements and commitments. The staff conclude that the contact information for the License RSO and the new Army authorizing official for this license should be incorporated by reference in License Condition No. 11. This portion of the License Amendment No. 3 is administrative.

In the course of its review, the staff identified other administrative changes that should be made to the license. These changes consisted of modification of sentences to ensure consistent use of acronyms and initialism, formatting changes, and correction of grammatical or typographical errors. The staff confirmed that these changes would not change any requirements or commitments or add new requirements or commitments. This portion of the License Amendment No. 3 is administrative.

The staff conclude that the findings described in the staff's SER report support the issuance of a license amendment requiring the use of the three revised final site-specific ERMPs by incorporation by reference; the incorporation by reference of the December 15, 2017, letter clarifying sediment sample collection; the incorporation by reference of the February 24, 2010, letter documenting the contact information for the License RSO; and the incorporation by reference of the September 5, 2018, letter documenting the new Army authorizing official for this license.

The staff find that the requested license amendment is in accordance with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), as well as the NRC's rules and regulations.

Therefore, the NRC finds that the license should be amended to incorporate by reference the revised final site-specific ERMPs for Fort Polk, LA, Fort Riley, KS, and the PTA, HI and removed the corresponding September 2016 versions from the License Condition 11. In addition, License Condition No. 18 should be amended to allow three months from the effective date of License Amendment No. 3 for the Army to implement the revised final site-specific ERMPs for Fort Polk, LA, Fort Riley, KS, and the PTA, HI. Also, the staff conclude that the license should be amended to incorporate by reference the December 15, 2017, letter clarifying sediment sample collection, as well as the February 24, 2010, letter documenting the contact information for the License RSO, and the September 5, 2018, letter documenting the new Army authorizing official for this license. In addition, the staff conclude that the license should be amended to address the consistent use of acronyms, initialisms, and formatting, and to correct grammatical errors and typographical errors.

Existing License Condition No. 11 (to be modified):

11. Except as specifically provided otherwise, the licensee shall conduct operations in accordance with the commitments, representations, and statements contained in the license amendment applications:

- Programmatic RSP, "Radiation Safety Plan for IMCOM Ranges Affected by M101 Davy Crockett Spotting Round Depleted Uranium," dated December 31, 2015 (ML16004A369);
- Programmatic PSP; "Physical Security Plan for US Army Installation Management Command Ranges Affected by Depleted Uranium in M101 Davy Crockett Spotting Rounds," dated December 31, 2015 (ML16004A369);
- Army's Form 313, "Application for Materials License," items 1-7, dated June 1, 2015 (Pkg. ML15161A454);
- Attachment 3, "Calculation of TEDE to Individual Likely to Receive Highest Dose, "dated June 1, 2015 (Pkg. ML15161A454);
- Attachment 4, "Attachment 4. How the Army Determined the M101DU RCAs," dated June 1, 2015 (Pkg. ML15161A454);
- Attachment 5, "Bounding Calculations Using RESRAD 7.0 and RESRAD-OFFSITE 3.1," dated June 1, 2015 (Pkg. ML15161A454);
- Attachment 8, "Arguments against Air Sampling During HE [High Explosive] Fire into RCAs [Radiation Control Areas]", dated June 1, 2015 (Pkg. ML15161A454);
- Email clarifying RCAs at Fort Knox, KY, dated January 29, 2016 (ML16041A107);
- Attachment 8, "Estimating Public Exposure to Airborne Depleted Uranium Outside the U.S. Army Pohakuloa Training Area, Hawaii," September 30, 2015, (ML15294A276);
- Attachment 9, "Examples of Army Range fires," September 30, 2015, (ML15294A276);
- Attachment 10, "Arguments against Air Sampling During HE Fire into RCAs, rev. 1,"

September 30, 2015, (ML15294A276);

- Attachment 11, "Calculation of Public Dose SOP," September 30, 2015 (ML15294A276);
- Programmatic ERMP, "Programmatic Approach for Preparation of Installation-specific Environmental Radiation Monitoring Plans", dated September 15, 2016 (ML16265A218);
- "US Army Decommissioning Funding Plan (DFP) for License Number SUC-1598," dated February 9, 2016 (ML16042A232);
- Maps of the locations of the RCAs, "M101 Impact Areas," dated December 31, 2015 (but, sent February 12, 2016, (ML16048A358);
- Army's emails clarifying M101 Target Areas (Radiation Control Areas), dated February 12, 2016 (ML16048A347) May 24, 2016 (ML16341C807), and December 7, 2016 (ML1651A092)
- Army's Statement of Intent, dated June 1, 2015 (ML15161A458);
- Site-Specific Environmental Radiation Monitoring Plans and Associated Quality Assurance Plan, dated September 15, 2016 (Pkg ML16265A221)

Proposed License Condition No.11 (administrative changes are in bold and changes due to the application and are shown in bold and shaded. These changes are shown as they would appear on Form 374, "Materials License" for Amendment No. 3, but without the bolding and shading):

- 11. Except as specifically provided otherwise, the licensee shall conduct operations in accordance with the commitments, representations, and statements contained in the license amendment applications:
 - Programmatic Radiation Safety Plan, "Radiation Safety Plan for IMCOM [Installation Management Command] Ranges Affected by M101 Davy Crockett Spotting Round Depleted Uranium," dated December 31, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16004A369);
 - Programmatic **Physical Security Plan**, "Physical Security Plan for **U[.]S[.]** Army Installation Management Command Ranges Affected by Depleted Uranium in M101 Davy Crockett Spotting Rounds," dated December 31, 2015 (**ADAMS Accession No.** ML16004A369);
 - Form 313, "Application for Materials License," items 1 7, dated June 1, 2015 (ADAMS Accession No. Pkg. ML15161A454, Form 313 at ADAMS Accession No. ML15161A458);
 - Attachment 3, "Calculation of TEDE **[Total Effective Dose Equivalent]** to Individual Likely to Receive Highest Dose," dated June 1, 2015 (ADAMS Accession No. Pkg. ML15161A454, Attachment 5 at ADAMS Accession No. ML1516A459);
 - Attachment 4, "How the Army Determined the M101DU RCAs [Radiation Control Areas]," dated September 30, 2015 (ADAMS Accession No. Pkg. ML15294A276, Attachment 4 at ADAMS Accession No. ML15294A278);
 - Attachment 5, "Bounding Calculations Using RESRAD 7.0 and RESRAD-OFFSITE 3.1," dated June 1, 2015 (ADAMS Accession No. Pkg. ML15161A454, Attachment 5 at ADAMS Accession No. ML15161A459);

- Email clarifying RCAs at Fort Knox, KY, dated January 29, 2016 (ADAMS Accession No. ML16041A107);
- Attachment 8, "Estimating Public Exposure to Airborne Depleted Uranium Outside the U.S. Army Pohakuloa Training Area, Hawaii," dated September 30, 2015 (Pkg. ADAMS Accession No. ML15294A276, Attachment 8 at ADAMS Accession No. ML15294A277);
- Attachment 9, "Examples of Army Range [F]ires," dated September 30, 2015 (ADAMS Accession No. Pkg. ML15294A276, Attachment 9 at ADAMS Accession No. ML15294A277);
- Attachment 10, "Arguments against Air Sampling During HE [High Explosive] Fire into RCAs, [R]ev. 1," dated September 30, 2015 (ADAMS Accession No. Pkg. ML15294A276, Attachment 10 at ADAMS Accession No. ML15294A277);
- Attachment 11, "'Calculation of Public Dose' SOP [Standard Operating Procedure]," dated September 30, 2015 (ADAMS Accession No. Pkg. ML15294A276, Attachment 11 at ADAMS Accession No. ML15294A277);
- Programmatic Environmental Radiation Monitoring Plan (ERMP), "Programmatic Approach for Preparation of Installation-specific Environmental Radiation Monitoring Plans", dated September 15, 2016 (ADAMS Accession No. ML16265A218);
- "U[.]S[.] Army Decommissioning Funding Plan (DFP) for License Number SUC-1593," dated February 9, 2016 (ADAMS Accession No. ML16042A232);
- Maps of the locations of the RCAs, "M101 Impact Areas," dated December 31, 2015 (but, sent February 12, 2016, **(ADAMS Accession No.** ML16048A358);
- Emails clarifying M101 Target Areas [Radiation Control Areas], dated February 12, 2016 (ADAMS Accession No. ML16048A347), May 24, 2016 (ADAMS Accession No. ML16341C807), and December 7, 2016 (ADAMS Accession No. ML1651A002);
 - December 7, 2016 (ADAMS Accession No. ML1651A092);
- Statement of Intent, dated June 1, 2015 (ADAMS Accession No. ML15161A458);
- Final Site-Specific ERMPs and Associated Quality Assurance Plan, dated September 2016 (ADAMS Accession No. Pkg. ML16265A221) for all Davy Crockett RCAs except those located at Fort Polk, LA, Fort Riley, KS, and the PTA, HI;
- Revised Final Site-Specific ERMPs for Fort Polk, LA, Annex 11; Fort Riley, KS, Annex 12; and PTA, Annex 17 RCAs, dated May 2017, May 2017, and April 2017, respectively (ADAMS Accession No. ML17158B356) and associated Quality Assurance Plan, dated September 2016 (ADAMS Accession No. ML16265A233);
- Letter dated December 15, 2017 (ADAMS Accession No. ML18009A456), clarifying sediment sample collection;
- Letter dated February 24, 2010 (ADAMS Accession No. ML120950352), documenting the contact information for the License Radiation Safety Officer (RSO) for this license; and
- Letter dated September 5, 2018 (ADAMS Accession No. ML18262A211), identifying the Army licensing official for this license.

Existing License Condition No. 18 (to be modified):

18. Within 6 months of the effective date of License Amendment No. 2, the licensee shall fully implement each installation's site-specific environmental radiation monitoring plan.

Proposed License Condition No. 18:

Within 3 months of the effective date of License Amendment No. **3**, the licensee shall fully implement each **of the revised final site-specific ERMPs for Fort Polk, LA, Fort Riley, KS, and the PTA, HI (ADAMS Accession No. ML17158B356)**.

2.0 Consultations with Other Agencies

The NRC determined that consultation under Section 7 of the Endangered Species Act of 1973 (ESA), and Section 106 of the National Historic Preservation Act of 1966 (NHPA) are not required for this proposed amendment.³

3.0 National Environmental Policy Act

The NRC determined an environmental assessment for this action is not required, because the proceeding was considered to fall within the Categorical Exclusion under 10 CFR 51.22(c)(14)(xv), 10 CFR 51.22(c)(10(iv)), and 10 CFR 51.22(c)(10)(v).

4.0 Acronyms and Initialisms

AEA	Atomic Energy Act of 1954, as amended
CATEX	Categorical Exclusion
CFR	Code of Federal Regulations
DU	Depleted Uranium
ERMP	Environmental Radiation Monitoring Plan
FR	Federal Register
FWS	U.S. Fish and Wildlife Service
IMCOM	U.S. Army Installation Management Command
NHPA	National Historic Preservation Act of 1980
NEPA	National Environmental Policy Act
NUREG	NRC technical report designation (<u>Nu</u> clear <u>Reg</u> ulatory Commission)
PSP	Physical Security Plan
RCA	Radiation Control Area
REM	roentgen equivalent man
RESRAD	dose assessment code for RESidual RADioactive materials

³ 16 USC 470 et seq.

RSP	Radiation Safety Plan
SOC	Statements of Consideration
SER	Safety Evaluation Report
SOI	Statement of Intent
SOP	Standard Operating Procedures
SRM	Staff Requirement Memorandum
TEDE	Total Effective Dose Equivalent

5.0 References

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

[DOE, 2008] *RESRAD Home Page.* [Online] Available at: <u>http://web.ead.anl.gov/resrad/home2/index.cfm</u> [Accessed 19 November 2012].

[NRC 1998b] "NRC Collection of Abbreviations, Rev. 4," July 1998.

[NRC 1999] 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," 1999.

[NRC 2000] NUREG-1575, "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM), Rev. 1," August 2000 (Agencywide Documents and Management System (ADAMS) Accession No. ML003761445).

[NRC 2003a] NUREG-1757, Vol. 3, "Consolidated NMSS Decommissioning Guidance: Financial Assurance, Recordkeeping and Timeliness, Rev. 1," September 2003 (ADAMS Accession No. ML12048A683).

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

[NRC 2006] NUREG-1757, Vol. 2, "Characterization, Survey, and Determination of Radiological Criteria, Revision 1," September 2006 (ADAMS Accession No. ML063000252).

[U.S. Army, 2010] Letter dated February 24, 2010 (ML120950352), documenting the contact information for the License Radiation Safety Officer (RSO) for this license.

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

[NRC 2016] Safety Evaluation Report for the U.S. Army's Possession License for Depleted Uranium from the M101 Spotting Round- Addition of 15 Sites, Amendment No. 1, March 21, 2016 (ADAMS Accession No. ML16039A230).

[U.S. Army, 2016] Final Site-Specific Environmental Radiation Monitoring Plans and Associated Quality Assurance Plan, dated September 2016 (Pkg. ADAMS Accession No. ML16265A221)

ADAMS	
Accession	
Nos.:	
ML16265A218	Programmatic Environmental Radiation Monitoring Plan
ML16265A234	Final Site-Specific Environmental Radiation Monitoring Plan.
	Donnelly Training Area, Fort Wainwright, Alaska, Annex 1
ML16265A235	Final Site-Specific Environmental Radiation Monitoring Plan.
	Fort Benning, Georgia, Annex 2
ML16265A237	Final Site-Specific Environmental Radiation Monitoring Plan.
	Fort Bragg, North Carolina, Annex 3
ML16265A238	Final Site-Specific Environmental Radiation Monitoring Plan.
	Fort Campbell, Kentucky, Annex 4
ML16265A239	Final Site-Specific Environmental Radiation Monitoring Plan.
	Fort Carson, Colorado, Annex 5
ML16265A240	Final Site-Specific Environmental Radiation Monitoring Plan,
	Fort Gordon, Georgia, Annex 6
ML16265A241	Final Site-Specific Environmental Radiation Monitoring Plan,
	Fort Hood, Texas, Annex 7
ML16265A242	Final Site-Specific Environmental Radiation Monitoring Plan,
	Fort Hunter Liggett, California, Annex 8
ML16265A243	Final Site-Specific Environmental Radiation Monitoring Plan,
	Fort Jackson, South Carolina, Annex 9
ML16265A224	Final Site-Specific Environmental Radiation Monitoring Plan,
	Fort Knox, Kentucky, Annex 10
ML16265A225	Final Site-Specific Environmental Radiation Monitoring Plan,
	Fort Polk, Louisiana, Annex 11
ML16265A226	Final Site-Specific Environmental Radiation Monitoring Plan,
	Fort Riley, Kansas, Annex 12
ML16265A227	Final Site-Specific Environmental Radiation Monitoring Plan,
	Fort Sill, Oklahoma, Annex 13
ML16265A228	Final Site-Specific Environmental Radiation Monitoring Plan,
	Joint Base Lewis-McChord, Tacoma, Washington, Annex 14
ML16265A22	Final Site-Specific Environmental Radiation Monitoring Plan,
	Yakima Training Center, Washington, Annex 15
ML16265A230	Final Site-Specific Environmental Radiation Monitoring Plan,
	Fort Dix, Joint Base McGuire-Dix-Lakehurst, New
	Jersey, Annex 16
ML16265A231	Final Site-Specific Environmental Radiation Monitoring Plan,
	Pohakuloa Training Area, Hawaii, Annex 17
ML16265A232	Final Site-Specific Environmental Radiation Monitoring Plan,
	Schotield Barracks Military Reservation, Oahu, Hawaii, Annex 18

ML16265A233 Final Environmental Radiation Monitoring Program, Programmatic Uniform Federal Policy-Quality Assurance Project Plan (UFP-QAPP), Annex 19

[U.S. Army, 2017] Letter requesting license amendment, dated June 1, 2017 (ADAMS Accession No. ML17158B356)

[U.S. Army, 2017] Revised Final Site-Specific Environmental Radiation Monitoring Plans ADAMS Accession Nos:

ML17158B356	Revised Final Site-Specific Environmental Radiation Monitoring Plan Fort
	Polk, Louisiana, Annex 11
ML17158B356	Revised Final Site-Specific Environmental Radiation Monitoring Plan,
	Fort Riley, Annex 12
ML17158B356	Revised Final Site-Specific Environmental Radiation Monitoring Plan,
	Pohakuloa Training Area, Hawaii, Annex 17.

[U.S. Army, 2017] Letter dated December 15, 2017 (ADAMS Accession No. ML18009A456).

[U.S. Army, 2018] Letter dated January 19, 2018 (ADAMS Accession No. ML18033A133).

[U.S. Army, 2018] Letter dated September 5, 2018 (ADAMS Accession No. ML18262A211).

[Yu, C., et al., 2001] *User's Manual for RESRAD Version 6.* Argonne, Illinois: Department of Energy Argonne National Laboratory, 2001.