

40-9083



**DEPARTMENT OF THE ARMY**  
U.S. ARMY INSTALLATION MANAGEMENT COMMAND  
2405 GUN SHED ROAD  
FORT SAM HOUSTON, TEXAS 78234-1223

REPLY TO  
ATTENTION OF

IMCG

FEB 6 2013

Mr. Larry Camper  
Director, Division of Waste Management and Environmental Protection  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

Subject: Army Second Response to US Nuclear Regulatory Commission (NRC) Proposed License Conditions for Davy Crockett M101 Spotting Round Depleted Uranium (DU)

Dear Mr. Camper:

On behalf of the Commanding General, Installation Management Command, the Army is providing you with a written response to the NRC's summary of our meeting held on December 12, 2012. The Army also reiterates the substance of our first response to the draft license, dated September 10, 2012. The Army is completely committed to the safety and welfare of its Soldiers, civilian employees, and their families who live and work on the installations at issue, and to good stewardship of the environment. In keeping with the Army's commitment, the Army provides the following response based on technical discussions with the NRC.

The Army does not waive its contention that exemption is appropriate. However, this response will focus on specific license conditions (LC) discussed in the December 12, 2012 technical meeting and referenced in the December 27, 2012 memorandum from Mr. Dominic Orlando, Subject: Meeting Summary – Technical Meeting Between U.S. Army Installation Management Command and U.S. Nuclear Regulatory Commission Staff to Discuss Licensing Depleted Uranium at the Schofield Barracks and Pohakuloa Training Area in Hawaii. The Army will address its continued request for exemption pursuant to 10 CFR §40.13(c)(5) and § 40.14 separately.

**License Condition 9C**

The Army stands by its position that environmental monitoring is not warranted based on the information and data provided (see Enclosure A). However, the Army is amenable to air sampling based on a specific, approved, sampling plan in order to provide additional site specific data to support our position. The general terms of this plan are outlined in Enclosure 2. A monitoring plan will be provided for NRC review and approval as soon as possible. In regards to the requirement for air monitoring, this "condition" should not be a license condition but rather a process outlined in the Radiation Safety Plan (RSP). This sampling, as detailed at Enclosure 2, will be for a specific time, and will cease upon completion provided that the results confirm that NRC effluent limits are not exceeded.

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#### **License Condition 11**

The Army believes that exit monitoring is not warranted for personnel and equipment leaving the BAX RCAs after training exercises. As discussed during the December 12, 2012 technical meeting, the Army is providing, at Enclosure 3 to this response, a summary of the results and a sampling of the site-specific data supporting this position. Exit monitoring data in the contractor's final reports,<sup>1</sup> available upon request, clearly shows that the contractor never detected contamination on personnel, vehicles or equipment during construction activities at both Schofield Barracks and Pohakuloa Training Area (PTA), even when the contractor did encounter and move DU fragments pursuant to its license. Based on these data, a requirement for exit monitoring for trainees, training cadre, and their vehicles and equipment is not necessary or reasonable. Exit monitoring for range maintenance personnel<sup>2</sup> will continue as a health physics standard of practice. If contamination is found during the exit monitoring described in the RSP, the Army will inform the NRC and reassess this issue. The Army will modify the proposed RSP consistent with this paragraph.

#### **License Condition 12**

Based on NRC statements, LC12 should be deleted as a license condition. Prioritization and submission of license amendments will be conducted on an internal Army-approved timeline. The Army will provide the approved timeline and changes to it to the NRC. Continued discussion and cooperation with NRC is essential to expedient progress and will be of high priority throughout the process. The Army believes that requiring environmental monitoring at sites, other than the Schofield BAX and PTA, as a condition of the current license is premature and unwarranted. Finally, specific environmental monitoring requirements are better suited to the "tie down conditions" contained in the RSP. These issues are properly addressed in subsequent amendments specific to RCAs located on other installations.

#### **License Condition 14**

The Army stands by its initial response regarding any newly identified operational ranges affected by M101 DU. The Army builds and operates all of its ranges, regardless of location, in a reasonably uniform manner. Therefore, commonalities among known and possible newly identified ranges are adequate for the NRC to apply requirements for the named installations to any newly identified M101 DU-affected ranges.

#### **License Condition 15**

The Army will provide Garrison Radiation Safety Officer information in accordance with the Radiation Safety Plan. The Army agrees with NRC's statements during the December 12, 2012

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<sup>1</sup> *Characterization and Removal of DU Munitions Debris for Pohakuloa Training Area Big Island, Hawaii*, Cabrera Services, August 2011.

*Radiological Construction Support & Final Status Survey of Impacted Areas Monthly Reports, Schofield Barracks, Hawaii*, Cabrera Services, 2012 (monthly reports are for May 2012 through September 2012).

<sup>2</sup> "Range maintenance personnel" include those performing activities that the Radiation Safety Plan authorizes and those performing radiation safety duties, but does not include those actively providing training and the trainees.

meeting and, as noted at page 4 of the meeting summary, the Army will maintain training information and all RSO information will be treated as confidential.

**License Condition 16**

The Army reiterates that this license condition is inappropriate and outside of NRC jurisdiction. Consultation between DoD and USFWS is governed by applicable provisions of the Endangered Species Act (ESA) and the Sikes Act, 16 U.S.C. 670c. The Army will continue its direct consultation with the USFWS as appropriate to any of its activities on these Army lands.

**License Condition 19**

Notification to the NRC of HE use, along with air monitoring, will be outlined in the Radiation Safety Plan. The Army agrees to provide notification to NRC of planned ground disturbing activities (GDA) to the extent possible. The term "GDA" is understood to mean the movement of tracked vehicles, the conduct of intentional range burns, and the firing of HE munitions that impact inside the RCA in areas not previously cleared of M101 DU fragments<sup>3</sup>. Although the requested 14 days notice is reasonable, it may not always be possible given the Operational Tempo of training and combat rotations. Air monitoring during GDA will be conducted in accordance with the approved air monitoring plan (see LC9C above and Enclosure 2) to gather data required to show that DU is not migrating outside of the RCA. As stated in Enclosure 2, that sampling plan will include a specific time, number of samples and sampling locations, and a stated endpoint. When the sampling endpoint is achieved, notice requirements will also cease.

Actual firing of munitions that contain HE into an RCA should not be viewed as a prohibited, limited, or allowed activity. As the NRC clearly states, the goal of the NRC is to protect public health and safety by ensuring that DU effluent in excess of allowable levels does not migrate outside of the RCA. Provided that goal is met, activities within the boundaries of the RCA are irrelevant and inappropriate license conditions.

**License Condition 21**

In its December 12, 2012 meeting summary, NRC states that License Condition 21, in conjunction with License Conditions 22 - 24 "are necessary to ensure that the Army complies with the requirements of 10 CFR 40.42." This implies that 10 CFR 40.42 is merely advisory rather than a requirement that must be followed. Assuming that 10 CFR 40.42 is a requirement with which the Army must comply, this License Condition is merely redundant language that serves to complicate an established process. Therefore, License Conditions 21 - 24 should be removed from the final license as the Army is currently bound by 10 CFR 40.42. In the alternative, this license condition may state that the Army will notify the NRC within 60 days of

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<sup>3</sup> Ground Disturbing Activities ("GDA") does not include small arms fire, inert training rounds, or travel on foot or in light wheeled vehicles.

a final decision to permanently close a range area subject to the license and will comply with applicable requirements of 10 CFR 40.42.

**License Condition 23**

See paragraph above regarding LC21.

**License Condition 24**

The Army will comply with applicable Federal laws and regulations regarding historical property. The NRC has no authority or jurisdiction to enforce any requirements related to the National Historic Preservation Act (NHPA) as to the Army. The Army objects to any additional language or redundant requirements, specifically any requirements not explicitly within NRC jurisdiction. The Army will meet all applicable requirements of the NHPA through direct consultation with State, Federal and local officials as appropriate for Army activities on installation lands. In addition, the Programmatic Agreement cited in the draft license is not applicable to the activities governed by the license and expressly excludes range operations from its terms. If the NRC intends in this provision to demonstrate its own compliance with the NHPA as stated in the December 27, 2012 letter, it may include its correspondence on this subject in the licensing record.

**License Condition 25**

Environmental monitoring reports will be submitted separately, based upon the RSP and data collection plan outlined above and in Enclosure 2. As stated earlier, the Army opposes an open-ended environmental monitoring requirement. The Army will develop a finite sampling plan wherein it will collect adequate air monitoring data to support the Army's contention that DU effluent in excess of allowable limits is not migrating outside of the RCA. Once adequate data is collected that supports the Army's contention, air monitoring outside of the RCA will cease.

**License Condition 26**

Although the Army asserts that data previously provided to NRC is adequate to show that air monitoring is not necessary (see Enclosure 1), the Army agrees that site-specific sampling data is the best indicator that further sampling is not necessary. However, air sampling should not be a specifically enumerated license condition, but rather a process outlined in the Radiation Safety Plan and accompanying documents (see LC25, above, and Enclosure 2). As noted by NRC staff at the December 12, 2012 meeting, site specific air monitoring data demonstrating that DU was not being released from the RCA could be the basis for limiting and/or ending air monitoring in the future (see December 12, 2012 Meeting Summary).

**License Condition 27**

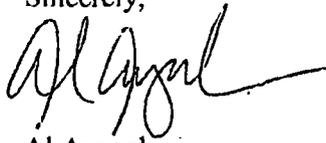
The Army will obtain additional plant samples on the Hawaii RCAs, analyze the samples, and provide the data to NRC. Plant sampling should not be a condition of the license, but rather contained in the Environmental Radiation Monitoring Plans. A specific number of samples, in an approved sampling plan, will be taken and analyzed accordingly. Results will be submitted to

the NRC. If the results indicate that plant uptake of DU at the site, does not exceed the uptake of naturally occurring uranium, further plant sampling will not be required.

The Army firmly believes that no risk to safety, health or the environment is present as a result of the legacy Davy Crockett M101 spotting round DU. Our responses reflect this position. Additionally, while the Army steadfastly believes that adequate data and calculations have been provided that show, unequivocally, there is no DU migration outside of the RCA in excess of NRC established effluent levels, the Army is committed to providing the site specific data indicated by the NRC as necessary to eliminate the air monitoring requirement.

The Army will provide a revised Radiation Safety Plan (RSP) following NRC's guidance and responses to the above comments. The revised RSP will include NRC's air sampling guidance and will replace (supersede) the previously submitted Environmental Radiation Monitoring Plan. The Army looks forward to a continued relationship and professional dialog in order to reach an agreement on the license at issue. Any further questions should be addressed to the Army POC, Dr. Robert (Bob) Cherry at (210) 466-0368 or by email at robert.n.cherry.civ@mail.mil.

Sincerely,



Al Aycock  
Major General, U.S. Army

CC

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Encls.

Encl. 1 – Comments on NRC's Remaining Proposed Air Sampling Requirements

Encl. 2 – Army Proposal for One-Time Air Sampling during High-Explosive (HE) Fire

Encl. 3 – Summary of Cabrera Frisking of Personnel and Vehicles

# Comments on NRC's Remaining Proposed Air Sampling Requirements

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The following selections are excerpts from the NRC's summary of the December 12, 2012, public technical meeting<sup>1</sup> and present the NRC's statements on air sampling.

The staff informed the Army of its conclusion that an exemption pursuant to 10 CFR 40.13(c)(5) or 40.14 was not warranted and that a license with some limited environmental monitoring (air monitoring during ground disturbing activities and range burns) was necessary.

... although RESRAD assumes some portion of the contamination is available for inhalation, the code does not attempt to simulate the environmental conditions present during ground disturbing activities such as a fire or use of high impact explosives and therefore is not relevant to the requirements for air monitoring. RESRAD, by default, assumes a mass loading for inhalation of 2.0E-4 g/m<sup>3</sup>, which is the air/soil concentration ratio of airborne contaminated soil particles, taking into account short periods of high mass loading and sustained periods of normal activity on a typical farm.

Based on the above, it is not clear if the activities requested by the Army, such as range burns, live fire exercises, etc. have the potential to allow DU to be released from the impact areas. Thus, the Army has not demonstrated that DU will not be released from the ranges in excess of NRC criteria at 10 CFR Part 20 and, as such, granting an exemption pursuant to 10 CFR Section 40.14 is not warranted.

... The NRC staff stated that the principal concern is to ensure that DU is not being released from the ranges in excess of NRC effluent release limits and that individuals occupying the RCAs on the ranges were protected. If the Army were to implement air monitoring adequate to detect airborne depleted uranium during ground disturbing activities, including firing high explosive ordnance into the RCAs, the license condition could be revised.

... Based on the staff's evaluation of the Army's RESRAD modeling above the staff agrees that continuous air sampling is not needed, but has concluded that air samples should be collected during range fires and ground disturbing activities. The rationale for this conclusion is that (1) the Army's burn data had large uncertainties and therefore, is not useful; and (2) RESRAD does not attempt to simulate the environmental conditions present during ground disturbing activities such as a fire or use of high impact explosives and therefore is not relevant to the requirements for air monitoring.

... The Army asked if it could supply additional air monitoring data demonstrating that air monitoring is not necessary and the NRC staff indicated that it could, but that site-specific data was the best way to demonstrate that DU was not being released from the RCA and that air monitoring using site-specific information could be a basis for revising the LC in the future.

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<sup>1</sup> NRC memorandum, December 27, 2012, subject: Meeting Summary – Technical Meeting between U.S. Army Installation Management Command and U.S. Nuclear Regulatory Commission Staff to Discuss Licensing Depleted Uranium at the Schofield Barracks and Pohakuloa Training Area in Hawaii, December 12, 2012 (ADAMS accession number 12354A165)

Encl 1

## **Air monitoring during range burns and other "ground disturbing activities"**

*"... the Army's burn data had large uncertainties and therefore, is not useful..."*

The above quote from the NRC's meeting summary refers to air sampling results for range burns that the Army presented on September 10, 2012.<sup>2</sup> As is customary in health physics documents, the Army reported these uncertainties at the 95 percent confidence level (two standard deviations). The largest uncertainties in the tables were  $11 \times 10^{-16} \mu\text{Ci mL}^{-1}$  and  $2.7 \times 10^{-16} \mu\text{Ci mL}^{-1}$  from the contractor's 2007 and 2009 reports, respectively. The NRC effluent standard for DU in air is  $6 \times 10^{-14} \mu\text{Ci mL}^{-1}$ . Thus, the largest uncertainty in each table is about 2 percent and 0.45 percent of the NRC's effluent standard, respectively. Statistically, these are not "large" uncertainties. Therefore, the "Army's burn data" are useful and should be considered when determining if further air monitoring is required.

It is certainly true that the "Army's burn data" had large *relative* uncertainties. This occurred because the uranium concentrations in air are near or below the minimum detectable concentrations of the laboratory instruments. However, the largest uncertainty in the two tables appears in the result  $(5 \pm 11) \mu\text{Ci mL}^{-1}$ . That is, this result shows that the  $^{238}\text{U}$  air concentration for the air sample is less than  $16 \times 10^{-16} \mu\text{Ci mL}^{-1}$  or 2.7 percent of the NRC effluent standard at the 95 percent confidence level, although we cannot say what the actual concentration really is. All other results in the two tables are less than this. Results with large relative uncertainties still provide "useful" information. Clearly, the range burn data show that the measured concentrations of uranium in air, even if we do not know their specific values, are at least two orders of magnitude less than the NRC's effluent standard.

Additionally, all of the  $^{238}\text{U}/^{234}\text{U}$  ratios are less than three and indicate that whatever uranium the air samplers detected was of natural origin.

We also invite the NRC to reexamine Table 2 in the "Army Response."<sup>3</sup> The results in that table "suffered" from the same NRC-identified "flaws" as did the range burn data. However, sufficient information was available to produce a composite result. The composite result for the  $^{238}\text{U}/^{234}\text{U}$  ratio was  $0.91 \pm 0.19$ , which clearly is indicative of natural uranium and not of DU.

In the Army's opinion, the existing range burn data and worksite data are clear, definitive, and "useful." They show that range burns and "ground disturbing activities" have not suspended depleted uranium into the air to any measurable degree. These site-specific results should persuade the NRC not to require the Army to perform air sampling during controlled range burns or during any other "ground disturbing activities."

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<sup>2</sup> See Table 5 and Table 6 in "Army Response to US Nuclear Regulatory Commission (NRC) Proposed License Conditions for Davy Crockett M101 Spotting Round Depleted Uranium (DU)" (ADAMS accession number ML 12265A173). These tables are included at the end of this document for convenience. Errata for Table 5: The units should be  $10^{-16} \mu\text{Ci/mL}$  (as they are in Table 6).

<sup>3</sup> This table is included at the end of this document for convenience.

## Air monitoring during training involving high-explosive (HE) fire

The Army provided the following comments on page 40 of the "Army response":

Because no more than 714 M101 spotting rounds were available for aerosolization by HE munitions on the two Hawaii ranges, [Dr. Morrow used a scenario of] two M101 spotting rounds per day aerosolized over a year. This [produces a] maximum DU activity concentration in air [of]  $1.9 \times 10^{-15} \mu\text{Ci mL}^{-1}$ , which is less than 1/30th of the NRC effluent limit for DU in air. A realistic but still conservative scenario, such as one HE munitions direct hit per week on an M101 spotting round, would reduce the hypothetical maximum DU activity concentration in air to much less than one percent of the NRC effluent limit for DU in air.

Clearly, the hypothetical aerosolization of M101 DU by HE munitions on Army ranges would produce DU air concentrations that "are authorized by law and will not endanger life or property or the common defense and security."

The NRC did not refer to this information in its meeting summary. The Army believes Dr. Morrow's calculations accurately predict the expected results of HE fire into a Davy Crockett M101 spotting round DU radiation controlled area.

The chance that an HE round might directly impact an M101 round and aerosolize it is small. For the scenario of 1000 M101 rounds in a one-kilometer square impact area, assume that the HE round must land within three meters of the M101 round to aerosolize it. Thus, the total "target" area for the HE round to hit an M101 round is  $A = 1000 \times \pi r^2 \approx 28,000 \text{ m}^2$ . The area of the one-kilometer square M101 impact area is  $1000 \text{ m} \times 1000 \text{ m} = 10^6 \text{ m}^2$ . So, the chance that a single HE round aerosolizes an M101 round upon impact is about  $2.8 \times 10^4 / 10^6$ , which is about 1 in 35.<sup>4</sup> That is, a negative result for DU for air sampling during HE fire could well be due to the fact that no M101 round was aerosolized.

This same argument applies for an M101 round that has oxidized and merged with the nearby soil. Instead of aerosolizing a mostly intact M101 round, the HE round would send the oxidized uranium into the air. The probability of this happening is similar to that of the aerosolization scenario.

Additionally, it is not prudent for the Army to position air samplers on the perimeter of an M101 impact area within an active HE firing range for the following two reasons.

1. The air samplers would be subject to damage by the HE fire and would require frequent replacement.
2. The M101 impact area is in a larger firing range that contains unexploded ordnance. The air sampling technician would require explosive ordnance disposal support every time he or she needed to service the air sampler.

The only way to perform the air sampling the NRC requires is to place the air samplers outside of the larger impact area.

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<sup>4</sup> This calculation is not strictly correct in that it assumes that none of 3-m radius circles overlap. Removing that assumption makes the calculation less transparent without changing the result by very much.

## Comments on NRC's Remaining Proposed Air Sampling Requirements

The Army believes that Dr. Morrow's calculations show that HE fire is highly unlikely to produce DU concentrations in air that would exceed even a small fraction of the NRC's effluent standards for uranium in air. Furthermore, the Army believes that air sampling during HE fires will only provide data that match Dr. Morrow's calculations, making the air sampling unnecessary.

### **Conclusion**

The Army repeats its assertion that air monitoring for DU under any circumstance is unnecessary and would be ineffective. Past measurements at its Hawaii ranges have never detected DU in the air. The Army has provided data and calculations that demonstrate no reasonable likelihood that any Army operation, including HE fire, will ever exceed even a small percentage of NRC effluent limits for uranium in air.

The Army cannot prove the negative, that no DU is leaving the M101 impact areas in the air or via any other pathway. However, the Army believes it has shown with no room for doubt that whatever DU is leaving the M101 impact areas is too little to detect via conventional means and is certainly much less than the NRC's effluent limits.

## Tables from "Army Response to US Nuclear Regulatory Commission (NRC) Proposed License Conditions for Davy Crockett M101 Spotting Round Depleted Uranium (DU)"

Table 2 Uranium isotopic analysis of archived air sample filters from Schofield Barracks worksite on M101 impact area

Sample ID	Activity Air Concentration ( $10^{-17}$ $\mu\text{Ci mL}^{-1}$ )		$^{238}\text{U}/^{234}\text{U}$ ratio	Volume ( $10^8$ mL)	Activity ( $10^{-8}$ $\mu\text{Ci}$ )		
	$^{234}\text{U}$	$^{238}\text{U}$			$^{234}\text{U}$	$^{238}\text{U}$	
SB-AS-002	9.2 ± 8.6	4.1 ± 5.0	0.4 ± 0.7	1.60	1.5 ± 1.4	0.7 ± 0.8	
SB-AS-003	1.6 ± 8.6	7 ± 10	4 ± 24	1.04	0.17 ± 0.89	0.7 ± 1.0	
SB-AS-004	18 ± 26	9 ± 23	0.5 ± 1.5	69.1	1.2 ± 1.8	0.6 ± 1.6	
SB-AS-005	13 ± 10	8.3 ± 8.9	0.6 ± 0.8	1.19	1.6 ± 1.2	1.0 ± 1.1	
SB-AS-006	-24 ± 22	2 ± 13	—	1.13	-2.7 ± 2.5	0.2 ± 1.5	
SB-AS-007	-5 ± 17	7 ± 12	—	75.0	-0.4 ± 1.2	0.5 ± 0.9	
SB-AS-008	0.00 ± 0.87	5.0 ± 7.2	—	1.35	0.0 ± 1.2	0.7 ± 0.9	
SB-AS-009	-4 ± 12	0.00 ± 0.94	—	1.50	-0.6 ± 1.8	0.0 ± 1.4	
SB-AS-010	8 ± 15	7 ± 12	0.9 ± 2.2	1.48	1.2 ± 2.2	1.0 ± 1.8	
SB-AS-011	7 ± 13	-2.5 ± 8.5	—	1.33	0.9 ± 1.7	-0.3 ± 1.1	
SB-AS-012	-1.1 ± 7.2	3.3 ± 6.6	—	1.59	-0.2 ± 1.1	0.5 ± 1.1	
SB-AS-013	5 ± 12	11.0 ± 9.0	2.2 ± 5.6	1.02	0.5 ± 1.2	1.1 ± 0.9	
SB-AS-014	6.2 ± 8.4	5.2 ± 6.9	0.8 ± 1.6	1.64	1.0 ± 1.4	0.9 ± 1.1	
SB-AS-015	8 ± 10	15 ± 11	1.9 ± 2.7	1.32	1.1 ± 1.3	2.0 ± 1.5	
SB-AS-016	3.5 ± 8.5	1.2 ± 5.8	0.3 ± 1.9	1.59	0.6 ± 1.4	0.2 ± 0.9	
SB-AS-017	1 ± 11	11.0 ± 9.8	10 ± 120	1.39	0.1 ± 1.5	1.5 ± 1.4	
SB-AS-018	-3.5 ± 7.7	2.3 ± 8.0	—	1.56	-0.5 ± 1.2	0.4 ± 1.3	
SB-AS-019	12.0 ± 7.4	6.5 ± 6.2	0.5 ± 0.6	1.74	2.1 ± 1.3	1.1 ± 1.1	
SB-AS-020	7 ± 13	0.0 ± 8.0	—	1.42	1.0 ± 1.9	0.0 ± 1.1	
SB-AS-021	9 ± 11	8.1 ± 8.4	0.9 ± 1.4	1.42	1.3 ± 1.6	1.2 ± 1.2	
SB-AS-022	9 ± 14	14 ± 12	1.6 ± 2.8	1.15	1.0 ± 1.6	1.6 ± 1.4	
SB-AS-023	9 ± 11	23 ± 17	2.6 ± 3.7	1.40	1.3 ± 1.5	3.2 ± 2.4	
<b>Composite</b>			<b>1.6 ± 1.1</b>		<b>12.1 ± 7.2</b>	<b>18.8 ± 6.1</b>	
Downwind of Work Area	SB-AS-024	27 ± 15	23 ± 13	0.9 ± 0.7	1.19	3.2 ± 1.8	2.7 ± 1.6
	SB-AS-025	50 ± 26	10 ± 23	0.2 ± 0.5	1.13	5.7 ± 2.9	1.1 ± 2.6
	SB-AS-026	40 ± 20	19 ± 15	0.5 ± 0.4	1.53	6.1 ± 3.1	2.9 ± 2.3
	SB-AS-027	16 ± 14	3.5 ± 9.6	0.2 ± 0.6	1.49	2.4 ± 2.1	0.5 ± 1.4
	SB-AS-028	74 ± 29	85 ± 30	1.1 ± 0.6	1.05	7.8 ± 3.1	8.9 ± 3.2
	SB-AS-029	64 ± 25	74 ± 25	1.2 ± 0.6	1.02	6.5 ± 2.6	7.6 ± 2.6
	SB-AS-030	19 ± 13	13 ± 11	0.7 ± 0.7	1.19	2.3 ± 1.6	1.6 ± 1.3
	SB-AS-031	62 ± 37	51 ± 31	0.8 ± 0.7	93.5	5.8 ± 3.5	4.8 ± 2.9
	SB-AS-032	26 ± 14	31 ± 13	1.2 ± 0.8	1.53	4.0 ± 2.1	4.7 ± 2.0
	SB-AS-033	11 ± 19	22 ± 16	2.0 ± 3.7	1.10	1.2 ± 2.1	2.4 ± 1.8
	SB-AS-034	36 ± 28	64 ± 33	1.8 ± 1.7	1.44	5.2 ± 4.0	9.2 ± 4.8
	SB-AS-035	62 ± 21	51 ± 19	0.8 ± 0.4	1.19	7.4 ± 2.5	6.1 ± 2.2
	SB-AS-036	12 ± 16	21 ± 15	1.8 ± 2.6	1.19	1.4 ± 1.9	2.5 ± 1.8
	SB-AS-037	73 ± 25	56 ± 20	0.8 ± 0.4	1.27	9.3 ± 3.2	7.1 ± 2.5
	SB-AS-038	35 ± 18	31 ± 16	0.9 ± 0.6	1.02	3.6 ± 1.8	3.2 ± 1.6
<b>Composite</b>			<b>0.91 ± 0.19</b>		<b>72 ± 10</b>	<b>65 ± 9</b>	

Activity air concentration and sample volume data from *Revised Final Report, Munitions Response/Construction Support, for the Battle Area Complex, Pohakuloa Training Area, Big Island, Hawaii, April 2012*, Huntsville, Alabama: US Army Engineering and Support Center

Comments on NRC's Remaining Proposed Air Sampling Requirements

**Table 5 Air Sampling results at Schofield Barracks downwind of a test burn with calculated  $^{238}\text{U}/^{234}\text{U}$  isotopic ratios**

Sample ID	Air Concentration ( $10^{-16}$ $\mu\text{Ci mL}^{-1}$ ) <sup>a</sup>		$^{238}\text{U}/^{234}\text{U}$ ratio
	$^{234}\text{U}$	$^{238}\text{U}$	
EF-TB-PB-1037-FP	6.8 ± 8.0	0.8 ± 5.4	0.11 ± 0.80
EF-TB-AS-1045-FP	0.77 ± 3.9	—	—
EF-TB-PB-1038-FP	2.3 ± 4.7	0.8 ± 5.5	0.3 ± 2.5
EF-TB-AS-1046-FP	2.0 ± 2.9	—	—
EF-TB-PB-1039-FP	-2.3 ± 4.7	5 ± 11	—
EF-TB-AS-1047-FP	—	2.7 ± 3.2	—
EF-TB-PB-1040-FP	3.2 ± 6.5	—	—
EF-TB-AS-1048-FP	1.3 ± 3.0	0.9 ± 1.9	0.7 ± 2.2
EF-TB-PB-1041-FP	2.7 ± 5.4	5.3 ± 7.6	2.0 ± 4.8
EF-TB-AS-1049-FP	3.0 ± 3.6	-1.3 ± 1.9	—
EF-TB-PB-1042-FP	—	2.4 ± 4.8	—
EF-TB-AS-1050-FP	—	(1.0 ± 2.0) × 10 <sup>-8</sup> $\mu\text{Ci}$	—
EF-TB-PB-1043-FP	3.8 ± 7.7	3.8 ± 7.6	1.0 ± 2.8
EF-TB-AS-1051-FP	4.4 ± 4.1	—	—
EF-TB-PB-1044-FP	2.9 ± 5.9	-1.0 ± 8.0	—
EF-TB-AS-1052-FP	0.93 ± 1.9	0.9 ± 1.9	1.0 ± 2.9

From *Summary of Air Monitoring and Soil/Vegetation Data from the Reference and Test Burns at Schofield Barracks (Draft)*, East Hartford, Connecticut: Cabrera Services, 2007

<sup>a</sup> Corrected units; original did not include the factor of 10<sup>-16</sup>

**Table 6 Prescribed range burn air sampling results**

Sample ID	Air Concentration ( $10^{-16}$ $\mu\text{Ci mL}^{-1}$ )		$^{238}\text{U}/^{234}\text{U}$ ratio
	$^{234}\text{U}$	$^{238}\text{U}$	
SB-D1-PT1-PB	0.9 ± 1.2	0.5 ± 1.0	0.5 ± 1.3
SB-D1-PT1-PB	1.4 ± 2.7	1.3 ± 2.3	0.9 ± 2.4
SB-D1-PT2-PB	0.44 ± 0.87	0.61 ± 0.67	1.4 ± 3.1
SB-D1-PT2-PB	1.6 ± 3.0	-0.9 ± 2.2	—
SB-D1-PT3-PB	0.39 ± 0.67	-0.08 ± 0.67	—
SB-D1-PT3-PB	1.0 ± 2.6	1.3 ± 2.7	1.3 ± 4.3
SB-D1-PT4-PB	0.61 ± 0.75	0.50 ± 0.75	0.8 ± 1.6
SB-D1-PT4-PB	0.2 ± 2.0	1.3 ± 2.4	8 ± 103
SB-D2-PT1-PB	0.76 ± 0.76	0.26 ± 0.55	0.34 ± 0.80
SB-D2-PT1-PB	0.30 ± 0.97	0.8 ± 1.1	2.7 ± 9.4
SB-D2-PT2-PB	1.4 ± 1.0	0.58 ± 0.72	0.41 ± 0.55
SB-D2-PT2-PB	0.4 ± 1.0	1.2 ± 1.3	2.9 ± 7.5
SB-D2-PT3-PB	-0.05 ± 0.55	1.9 ± 1.1	—
SB-D2-PT3-PB	0.7 ± 1.2	0.08 ± 0.91	0.1 ± 1.3
SB-D2-PT4-PB	0.36 ± 0.62	0.10 ± 0.62	0.3 ± 1.8
SB-D2-PT4-PB	1.7 ± 1.4	0.20 ± 0.94	0.12 ± 0.56

From Table 2 of *Summary of Air Monitoring for the 2008 Prescribed Range Burns at Schofield Barracks*, Cabrera Services, 2009

# Army Proposal for One-Time Air Sampling during High-Explosive (HE) Fire

The Nuclear Regulatory Commission (NRC) has proposed a license condition that requires the Army to perform air sampling during "ground disturbance activities" on its ranges affected by legacy Davy Crockett M101 spotting round depleted uranium (DU). The Army disagrees with that proposed license condition. However, in a good faith effort to comply with the spirit of the NRC-proposed license condition, the Army makes the following counter-proposal.

The Army will perform air sampling for DU during HE fire, and other ground disturbing activities, at the Schofield Barracks Battle Area Complex (BAX). If the Army does not detect DU during this exercise, the Army expects that the NRC will not require air sampling as a license condition for any license-allowed operation on all Army ranges. The Army takes this position because it believes that:

- The Army's previous attempts to measure DU suspended into the air by ground disturbance activities have detected uranium (natural, not DU) only at air concentrations well below the NRC's effluent limits.
- Any DU suspended into the air by ground disturbance activities, including HE fire, essentially is not detectable by conventional air sampling techniques, especially against the natural uranium background.
- According to the Army's calculations and previous measurements, DU suspended into the air by ground disturbance activities, including HE fire, poses no unacceptable risk to health or the environment.
- Air sampling is labor-intensive and expensive. The risk to health and the environment due to airborne DU in no way justifies air sampling. Indeed, placing air samplers and collecting air filters on active firing ranges that contain unexploded ordnance (UXO) involves much greater risks. Hence, the Army must place air samplers outside the firing ranges. These greater distances from the DU radiation controlled areas (RCAs) reduce the already small chance that air sampling will detect any DU.
- DU concentrations in RCA soil are comparable or less than natural uranium concentrations in soil. This makes the detection of DU in air samples unlikely in that natural uranium will mask the DU, given that, according to experience, any detected uranium likely will be at only a few percent of the NRC's effluent limits.
- The NRC air-sampling license condition cannot be open-ended.

This proposed air-sampling project is unfunded at the time of this writing. The Army will locate a funding source as soon as possible.

The Army provided a proposed air-sampling plan for Pohakuloa Training Area (PTA) in 2009.<sup>1</sup> That plan included the placement of three air samplers downwind and one upwind of the PTA RCA. The NRC "concluded that the Plan will provide inconclusive results for the U.S. Army as to the potential impact of

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<sup>1</sup> NRC Agencywide Documents Access and Management System (ADAMS) accession number ML100640108

## Army Proposal for One-Time Air Sampling during High-Explosive (HE) Fire

the dispersal of depleted uranium (DU) while the Pohakuloa Training Area is being utilized for aerial bombardment or other training exercises.”<sup>2</sup>

The Army will use the previously submitted report and the NRC’s response to it as a starting point for the design of a new plan for the Schofield Barracks BAX. The Army will submit the new plan to the NRC for its review. The Army will not begin air sampling until the NRC agrees with the air-sampling plan.

The Army, via its contractor, will implement the NRC-approved air-sampling plan before, during, and after live-fire training at the Schofield Barracks BAX. This training will include HE fire into impact areas inside the RCA. The NRC will grant permission for this HE fire for the purposes of this air-sampling project. The Army will include the number and types of rounds fired into the RCA impact area in the final report.

The Army contractor will send air sample filters for analyses at a qualified radiochemistry laboratory. The types of analyses will be gross alpha, and alpha and gamma spectroscopy for uranium isotopes for all of the samples. Samples with results in the highest ten percent also will undergo analysis by inductively coupled plasma mass spectrometry for uranium isotopes.

The Army contractor will prepare a report of the air-sampling project. Following Army review and approval, the Army will send the final version of report to the NRC.

Assuming the air-sampling project detects no DU, the Army will ask the NRC not to include a license condition that requires air sampling during any license–allowed operation on legacy DU-affected ranges. The Army also will include the results from this air-sampling project in its continuing request for exemption from licensing.

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<sup>2</sup> ADAMS accession number ML100350664

# Summary of Cabrera Frisking of Personnel and Vehicles

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## Frisking Results for Pohakuloa Training Area

*Revised Final Report Munitions Response/Construction Support For the Battle Area Complex Pohakuloa Training Area Big Island, Hawaii; USA Environmental, Inc. 720 Brooker Creek Boulevard, Suite 204 Oldsmar, FL 34677 April 2012*

*Characterization and Removal of DU Munitions Debris for Pohakuloa Training Area Big Island, Hawaii; Cabrera Services, August 2011*

In its daily operations summary, Cabrera reported that it frisked personnel and vehicles upon departure from Pohakuloa Training Area.

All "frisk logs" in the contractor's report show no activity detected.

### Summary and Conclusion from Contractor's Report

"The radionuclide of concern for PTA site was DU. None of the radiological data identified any contamination prior to, during, or after construction activities at Range 11T. No DU was found during construction work activities. Therefore, no investigation-derived waste (IDW) was generated. The exposure rate measurements, gamma walkover data, radiological surveys, and air sample results were consistent with background levels of radiation."

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## Frisking Results for Schofield Barracks

*Schofield Barracks, Radiological Construction Support & Final Status Survey of Impacted Areas, Monthly Report, Period Covered: [separate reports for each month from May 2012 through October 2012], Cabrera Services Inc., 3355 Myrtle Ave, Suite 210, North Highlands, CA 95660*

The following information is from the October 2012 report. Reports from all other months were similar.

Radiological support included "Frisking and monitoring vehicles and personnel exiting the RCA."

"All personnel working inside the RCA were frisked out prior to lunch and upon exiting the RCA by trained radiation technicians. A detailed log listing vehicle ID numbers and number of personnel exiting the RCA, instrument information, technician, date and time, and frisking results were maintained daily. The project action level was used 100 counts per minute (cpm) above ambient background. No contaminations were detected. Copies of the frisking log are provided ....."

Table 3: RCA Control Surveys

Survey Type	Number of Surveys	Exceedances of Limits
Personnel	1531	0
Equipment	880	0

Encl 3

Summary of Cabrera Frisking of Personnel and Vehicles

Sample "Frisking Logs" for Pohakuloa Training Area



Location : Pohakuloa Training Area (PTA) - Big Island, HI  
 Date : 1/22/2011  
 Description : Frisking Log  
 Instrument: Model 2360  
 Probe: 43-93

Serial Number: 125770  
 Serial Number: P1260671

Parameter	Static	
	Alpha	Beta
Efficiency	0.2618	0.1160
Background (cpm)	1	118

Detection Limit for Alpha: 100 dpm/100 cm<sup>2</sup>  
 Detection Limit for Beta: 1000 dpm/100 cm<sup>2</sup>

Date	Time	Vehicle License #	Name of Person(s)	Highest alpha (cpm)	Highest beta (cpm)	Agency Belongs (yes/no)	Sign Out	Techn (initials)	Comments
1/22/11	8:14	MEI WALK		0	180	YES/NO			
	9:09	Orange		1	180	YES/NO			
	9:09	Yellow		5	148	YES/NO			
	10:22	Orange		2	130	YES/NO			
	10:25	Yellow		0	170	YES/NO			
	10:31	742 HDS		0	180	YES/NO			
	10:35	HIL 918		0	150	YES/NO			
	11:31	Yellow		2	180	YES/NO			
	11:35	Orange		0	170	YES/NO			
	12:07	FLA 112		1	190	YES/NO			
	12:10	Orange		1	190	YES/NO			
	12:53	Yellow		0	170	YES/NO			
	13:15	MEI WALK		1	180	YES/NO			
	13:40	Orange		1	170	YES/NO			
	14:03	Yellow		0	190	YES/NO			
						YES/NO			

→ SAME TWO DRIVERS X

Summary of Cabrera Frisking of Personnel and Vehicles



Location : Pohakuloa Training Area (PTA) - Big Island, HI  
 Date : 1/24/11  
 Description : Frisking Log  
 Instrument: Model 2360  
 Probe: 43-83

Serial Number: 16047  
 Serial Number: PR199633

Parameter	Static	
	Alpha	Beta
Efficiency	0.198	0.155
Background (cpm)	2	201

Detection Limit for Alpha: 100 dpm/100 cm<sup>2</sup>  
 Detection Limit for Beta: 1000 dpm/100 cm<sup>2</sup>

Date	Time	Vehicle ID/License #	Name of Personnel	Highest alpha (cpm)	Highest beta (cpm)	Alpha Detected (cpm) (yes/no)	Beta Detected (cpm) (yes/no)	Comments
1/24/11	0730	762-HDR	[REDACTED]	1	182	YES	NO	
	↓	↓	[REDACTED]	↓	↓	YES	NO	
1/24/11	0836	21757	[REDACTED]	0	194	YES	NO	
1/24/11	0842	110-01	[REDACTED]	0	184	YES	NO	
1/24/11	0948	537 HD5	[REDACTED]	1	198	YES	NO	
"	"	"	[REDACTED]	↓	↓	YES	NO	
1/24/11	1020	21757	[REDACTED]	1	204	YES	NO	
1/24/11	1033	110-01	[REDACTED]	0	195	YES	NO	
1/24/11	1119	275 HD5	[REDACTED]	0	201	YES	NO	
1/24/11	1135	21757	[REDACTED]	1	187	YES	NO	
<del>1/24/11</del>	<del>1100</del>	<del>110-01</del>	<del>[REDACTED]</del>	<del>1</del>	<del>202</del>	<del>YES</del>	<del>NO</del>	
1/24/11	1157	110-01	[REDACTED]	1	202	YES	NO	
1/24/11	1223	762-HDR	[REDACTED]	1	174	YES	NO	
	↓	↓	[REDACTED]	1	174	YES	NO	
1/24/11	1223	717 HD	[REDACTED]	1	191	YES	NO	
1/24/11	1301	21757	[REDACTED]	1	182	YES	NO	

Summary of Cabrera Frisking of Personnel and Vehicles

Sample "Frisking Logs" for Schofield Barracks



RERA SERVICES  
ENVIRONMENTAL REMEDIATION

R 1 of 4

Frisking Log for Schofield Army Barracks BAX Construction Support - Oahu, HI

Cabrera Project # 08-3123.00

Date	Time	Vehicle ID/License #	# of Personnel	Location	Inst Type	Inst #	Probe Type	Probe #	Bg (cpm)	Radon Detected (circle one)	Comments	Tech (Initials)
10-3-12	0710	NMP 669	2	Area 2, CP	L-12	10288	44-9	125519	40	Yes/No		
	0712	1545M	1	Area 2, CP	L-12		44-9			Yes/No		
	0806	RPL 429	2	Area 2, CP	L-12		44-9			Yes/No		
	0818	591TSV	2	Area 2, CP	L-12		44-9			Yes/No		
	0848	875TR	1	Area 2, CP	L-12		44-9			Yes/No		
	0851	153TTV	3	Area 2, CP	L-12		44-9			Yes/No		
	0853	998TSU	6	Area 2, CP	L-12		44-9			Yes/No		
	0855	RPL 573	1	Area 2, CP	L-12		44-9			Yes/No		
	0921	789TSF	2	Area 2, CP	L-12		44-9			Yes/No		
	0927	241TSN	1	Area 2, CP	L-12		44-9			Yes/No		
	0938	C100	1	Area 2, CP	L-12		44-9			Yes/No		
	0940	913TTE	2	Area 2, CP	L-12		44-9			Yes/No		
	0941	306TTW	2	Area 2, CP	L-12		44-9			Yes/No		
	0942	B28TTS	2	Area 2, CP	L-12		44-9			Yes/No		
	0943	085TTG	2	Area 2, CP	L-12		44-9			Yes/No		
	0945	826TTR	2	Area 2, CP	L-12		44-9			Yes/No		
	0958	RPN 955	2	Area 2, CP	L-12		44-9			Yes/No		
	1009	241TSN	1	Area 2, CP	L-12		44-9			Yes/No		
	1016	466TNI	1	Area 2, CP	L-12		44-9			Yes/No		
	1036	LB2120	2	Area 2, CP	L-12		44-9			Yes/No		
10-3-12	1037	591TSV	1	Area 2, CP	L-12	142112	44-9	125519	40	Yes/No		

\* If radon is detected, list the amount in gross cpm and the actions taken in the comment section

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Summary of Cabrera Frisking of Personnel and Vehicles



Frisking Log for Schofield Army Barracks BAX Construction Support - Oahu, HI

Cabrera Project # 08-3123.00

Date	Time	Vehicle ID/License #	# of Personnel	Location	Inst. Type	Inst #	Probe Type	Probe #	Eqv (cpm)	Activity Detected (check one)	Comments	Tech (initials)
10-26-12	9:33	886 TTR	2	Area B, CP	L-12	125227	44-9	PR 125220	70	Yes/No		
10-26-12	9:57	RPC573	1	Area B, CP	L-12	125227	44-9	PR 125220	70	Yes/No		
10-26-12	11:20	RPC533	1	Area B, CP	L-12	125227	44-9	PR 125220	40	Yes/No		
10-26-12	11:20	RPC492	1	Area B, CP	L-12	125227	44-8	PR 125220	40	Yes/No		
10-26-12	11:20	07933	2	Area B, CP	L-12	125227	44-8	PR 125220	40	Yes/No		
J	1316	DA33	1	Area B, CP	L-12	125227	44-9	PR 125220	40	Yes/No		
	1339	RPC573	2	Area B, CP	L-12		44-9		70	Yes/No		
	1427	RPC573	2	Area B, CP	L-12		44-9		70	Yes/No		
	1452	E129	2	Area B, CP	L-12		44-8			Yes/No		
	1509	D933	2	Area B, CP	L-12		44-9			Yes/No		
	1530	C100	2	Area B, CP	L-12		44-9			Yes/No		
	1532	DA33	2	Area B, CP	L-12		44-9			Yes/No		
	1523	RPC573	2	Area B, CP	L-12		44-9			Yes/No		
	1535	RPC429	2	Area B, CP	L-12		44-9			Yes/No		
					Area B, CP	L-12		44-9			Yes/No	
				Area B, CP	L-12		44-9			Yes/No		
				Area B, CP	L-12		44-9			Yes/No		
				Area B, CP	L-12		44-9			Yes/No		
				Area B, CP	L-12		44-9			Yes/No		
				Area B, CP	L-12		44-9			Yes/No		
10-26-12				Area B, CP	L-12	125227	44-9	125220	70	Yes/No		

\* If activity is detected, list the amount in gross cpm and the actions taken in the comments section.