



DEPARTMENT OF THE ARMY
INSTALLATION MANAGEMENT COMMAND
US ARMY GARRISON-ROCK ISLAND ARSENAL
1 ROCK ISLAND ARSENAL
ROCK ISLAND, ILLINOIS 61299-5000

REPLY TO
ATTENTION OF:

MAY 02 2012

Office of the Garrison Manager

Mr. Mark Satorius
Director, Office of Federal and State Materials
and Environmental Management Programs
ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Satorius:

I am enclosing our response to Mr. McConnell's April 2, 2012 letter, subject: Response to Army Extension Request of November 28, 2011, Concerning JPG Decommissioning Plan. The source material license number for the depleted uranium at Jefferson Proving Ground is SUB-1435. Your docket number is 40-9083.

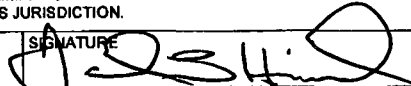
The enclosure consists of NRC Form 313 with supporting information on additional pages that responds to the requests for additional information in your April 2 letter. We reiterate our request for the extension.

My point of contact for this action is Dr. Robert Cherry at 210-466-0368 or by email at robert.n.cherry.civ@mail.mil.

Sincerely,


Joel G. Himsl
Garrison Manager

FSME20

NRC FORM 313 (1-2012) 10 CFR 30, 32, 33, 34, 35, 36, 39, and 40	U.S. NUCLEAR REGULATORY COMMISSION	APPROVED BY OMB: NO. 3150-0120 Estimated burden per response to comply with this mandatory collection request: 4.3 hours. Submittal of the application is necessary to determine that the applicant is qualified and that adequate procedures exist to protect the public health and safety. Send comments regarding burden estimate to the Information Services Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to Infocollects.Resource@nrc.gov , and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0120), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.	EXPIRES: (03/31/2012)		
APPLICATION FOR MATERIALS LICENSE					
INSTRUCTIONS: SEE THE APPROPRIATE LICENSE APPLICATION GUIDE FOR DETAILED INSTRUCTIONS FOR COMPLETING APPLICATION. SEND TWO COPIES OF THE ENTIRE COMPLETED APPLICATION TO THE NRC OFFICE SPECIFIED BELOW.					
APPLICATION FOR DISTRIBUTION OF EXEMPT PRODUCTS FILE APPLICATIONS WITH: OFFICE OF FEDERAL & STATE MATERIALS AND ENVIRONMENTAL MANAGEMENT PROGRAMS DIVISION OF MATERIALS SAFETY AND STATE AGREEMENTS U.S. NUCLEAR REGULATORY COMMISSION WASHINGTON, DC 20555-0001 ALL OTHER PERSONS FILE APPLICATIONS AS FOLLOWS: IF YOU ARE LOCATED IN: ALABAMA, CONNECTICUT, DELAWARE, DISTRICT OF COLUMBIA, FLORIDA, GEORGIA, KENTUCKY, MAINE, MARYLAND, MASSACHUSETTS, NEW HAMPSHIRE, NEW JERSEY, NEW YORK, NORTH CAROLINA, PENNSYLVANIA, PUERTO RICO, RHODE ISLAND, SOUTH CAROLINA, TENNESSEE, VERMONT, VIRGINIA, VIRGIN ISLANDS, OR WEST VIRGINIA, SEND APPLICATIONS TO: LICENSING ASSISTANCE TEAM DIVISION OF NUCLEAR MATERIALS SAFETY U.S. NUCLEAR REGULATORY COMMISSION, REGION I 475 ALLENDALE ROAD KING OF PRUSSIA, PA 19406-1415		IF YOU ARE LOCATED IN: ILLINOIS, INDIANA, IOWA, MICHIGAN, MINNESOTA, MISSOURI, OHIO, OR WISCONSIN, SEND APPLICATIONS TO: MATERIALS LICENSING BRANCH U.S. NUCLEAR REGULATORY COMMISSION, REGION III 2443 WARRENVILLE ROAD, SUITE 210 Lisle, IL 60532-4352 ALASKA, ARIZONA, ARKANSAS, CALIFORNIA, COLORADO, HAWAII, IDAHO, KANSAS, LOUISIANA, MISSISSIPPI, MONTANA, NEBRASKA, NEVADA, NEW MEXICO, NORTH DAKOTA, OKLAHOMA, OREGON, PACIFIC TRUST TERRITORIES, SOUTH DAKOTA, TEXAS, UTAH, WASHINGTON, OR WYOMING, SEND APPLICATIONS TO: NUCLEAR MATERIALS LICENSING BRANCH U.S. NUCLEAR REGULATORY COMMISSION, REGION IV 1600 E. LAMAR BOULEVARD ARLINGTON, TX 76011-4511			
PERSONS LOCATED IN AGREEMENT STATES SEND APPLICATIONS TO THE U.S. NUCLEAR REGULATORY COMMISSION ONLY IF THEY WISH TO POSSESS AND USE LICENSED MATERIAL IN STATES SUBJECT TO U.S. NUCLEAR REGULATORY COMMISSION JURISDICTIONS.					
1. THIS IS AN APPLICATION FOR (Check appropriate item) <input type="checkbox"/> A. NEW LICENSE <input checked="" type="checkbox"/> B. AMENDMENT TO LICENSE NUMBER <u>SUB-1435</u> <input type="checkbox"/> C. RENEWAL OF LICENSE NUMBER _____		2. NAME AND MAILING ADDRESS OF APPLICANT (Include ZIP code) Mr. Joel G. Himsl Garrison Manager 1 Rock Island Arsenal Rock Island, IL 61299-5000			
3. ADDRESS WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED Jefferson Proving Ground Madison, IN 47250-5100		4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION Robert Cherry TELEPHONE NUMBER (210) 466-0368			
SUBMIT ITEMS 5 THROUGH 11 ON 8-1/2 X 11" PAPER. THE TYPE AND SCOPE OF INFORMATION TO BE PROVIDED IS DESCRIBED IN THE LICENSE APPLICATION GUIDE.					
5. RADIOACTIVE MATERIAL a. Element and mass number; b. chemical and/or physical form; and c. maximum amount which will be possessed at any one time.		6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED.			
7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING EXPERIENCE.		8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS.			
9. FACILITIES AND EQUIPMENT.		10. RADIATION SAFETY PROGRAM.			
11. WASTE MANAGEMENT.		12. LICENSE FEES (See 10 CFR 170 and Section 170.31) <table style="width:100%;"> <tr> <td style="width:70%;">FEE CATEGORY</td> <td style="width:30%;">AMOUNT ENCLOSED \$</td> </tr> </table>		FEE CATEGORY	AMOUNT ENCLOSED \$
FEE CATEGORY	AMOUNT ENCLOSED \$				
13. CERTIFICATION. (Must be completed by applicant) THE APPLICANT UNDERSTANDS THAT ALL STATEMENTS AND REPRESENTATIONS MADE IN THIS APPLICATION ARE BINDING UPON THE APPLICANT. THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATION ON BEHALF OF THE APPLICANT, NAMED IN ITEM 2, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PARTS 30, 32, 33, 34, 35, 36, 39, AND 40, AND THAT ALL INFORMATION CONTAINED HEREIN IS TRUE AND CORRECT TO THE BEST OF THEIR KNOWLEDGE AND BELIEF. WARNING: 18 U.S.C. SECTION 1001 ACT OF JUNE 25, 1948 62 STAT. 749 MAKES IT A CRIMINAL OFFENSE TO MAKE A WILLFULLY FALSE STATEMENT OR REPRESENTATION TO ANY DEPARTMENT OR AGENCY OF THE UNITED STATES AS TO ANY MATTER WITHIN ITS JURISDICTION.					
CERTIFYING OFFICER - TYPED/PRINTED NAME AND TITLE Joel G. Himsl, Garrison Manager		SIGNATURE 	DATE 2 MAY 12		
FOR NRC USE ONLY					
TYPE OF FEE	FEE LOG	FEE CATEGORY	AMOUNT RECEIVED	CHECK NUMBER	COMMENTS
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APPROVED BY				DATE	

Enclosure to NRC Form 313

Background

In our November 28, 2011, letter to Dr. Michael Lee of the Low-Level Waste Branch at the US Nuclear Regulatory Commission (NRC), the Army requested “an extension of twenty months for the submittal of the Decommissioning Plan (DP) and Environmental Report (ER) for SUB-1435 to not later than the end of September 2013.” License Condition 13 of the Jefferson Proving Ground materials license required the submission of a Decommissioning Plan no later than December 31, 2011.

The NRC responded in an April 2, 2012, letter (subject: Response to Army Extension Request of November 28, 2011, Concerning JPG Decommissioning Plan). In that letter, the NRC wrote, “... the Army should submit a license amendment request for an alternate schedule for the submission of a Decommissioning Plan that complies with the NRC’s regulations within sixty (60) days of the date of this letter or the original request will be denied.”

The Army’s intention is to meet the NRC’s request with the information provided below that responds to the April 2 letter.

“Changes to existing license conditions must be pursued through a request for license amendment.”

The Army did not recognize that the extension request required a formal request for an amendment using NRC Form 313; accordingly the Army includes a signed NRC Form 313 as part of this response.

“Explain why the extension request is necessary to the effective conduct of decommissioning operations.”

The Army requested the extension to the originally approved alternate decommissioning schedule because the Army and the NRC did not resolve technical concerns regarding the site-specific partition coefficient (K_d) study until November 2011. After this resolution, the remaining work required to properly determine K_d would take substantially more than the two months remaining in 2011 before the due date in license condition 13 for the Jefferson Proving Ground (JPG) Decommissioning Plan (DP) and Environmental Report (ER).

The Army and NRC agreed that collecting site-specific K_d data was necessary to ensure the adequacy of the JPG DP. Submitting the DP without site-specific K_d data would have brought more delays and possibly more issues to resolve in developing proper courses of action. Building the DP based on published K_d values could produce an inappropriate DP as evidenced by previous NRC comments on this issue.

The restricted release license termination of the JPG depleted uranium (DU) license is one-of a kind, so the Army wants NRC’s review of site-specific K_d data prior to submitting the DP to

avoid submitting an incomplete document. Therefore, effective conduct of decommissioning operations requires an extension to the originally approved alternate decommissioning schedule in order to properly complete the K_d study for integration into the JPG DP.

K_d is used to determine the rate of contaminant (uranium) transport relative to that of groundwater and is an important site-specific input parameter for contaminant modeling. Values for K_d vary greatly for uranium as a function of aqueous and solid phase chemistry, fluctuating over six orders of magnitude because K_d is "...a lumped parameter representing a myriad of processes..." (NRC 2006). As a result, the NRC encourages licensees to perform site-specific K_d determination when default values could be unacceptably inaccurate.

In an October 5, 2004 letter to the Army (NRC Agencywide Documents Access and Management System (ADAMS) accession number ML042710122), NRC stated: "... the NRC staff responded that the off-site transport models need to be validated before it could terminate the Army's license and cease environmental monitoring. The Army has stated that many of the parameters used for modeling were determined from literature values of these parameters and not from actual field measurements. To validate the off-site transport models, the staff's position is that site-specific data are needed."

In a January 31, 2005 letter to NRC (ADAMS accession number ML050330496), the Army "... evaluated the dose assessment procedure documented in the June 2002 DP and determined the impact of site-specific physical and exposure parameters on the total dose. The sensitivity analysis completed in this evaluation indicated three parameters for which site-specific data would enhance the accuracy and reliability of the model." One of these parameters was K_d .

While agreement between the Army and NRC was reached on the need to conduct a site-specific K_d study, the NRC staff has identified in letters and meetings a number of comments and questions regarding the study design. In the November 2, 2011 letter to the Army, the NRC appears to have agreed with the Army's plan to re-collect all of the samples needed to conduct the site-specific K_d study to ensure the usage of defensible quality data in the DP and ER. To address the only remaining concern identified in the letter, the Army collected soils other than pre-Wisconsinan till from the 0-foot to 4-foot soil column in March 2012.

On November 28, 2011, the Army requested a 20-month extension for the submittal of the JPG DP and ER due to the schedule constraints. The Army reiterates here the same 20-month extension request (starting in January 2012 and ending to no later than the end of August 2013) for the following reasons:

- Winter weather had begun setting in at JPG and by the time that the letter had been received, and the Army believed at the time that snow would have covered much of the DU Impact Area and the ground and water was frozen, making it difficult and unsafe for the sampling team to collect surface soil and water needed for the study. While the Army anticipated that it would not collect these samples until April 2012, it actually collected them during the final week of March 2012.
- The Army expects analytical testing at the laboratory to take about three months to complete (July 2012).

- Completing the fate and transport and residual dose modeling and analyzing that information will take another six months (January 2013), which includes time to submit a modeling report with the site-specific K_d data for NRC's review and comment.
- Internal Army reviews will take six months to complete (July 2013).

The Army's request includes an increase in the time needed to complete the JPG DP/ER compared with that time presented at the October 2010 meeting at NRC headquarters. Slide 83 from that meeting indicated that K_d testing would start in November 2010 and slide 84 indicated the DP/ER would be submitted to NRC in December 2011. Thus, at that time the Army estimated 14 months between the beginning of the K_d testing and the submittal of the DP/ER. The 20-month extension requested in the November 28, 2011 letter assumes that the K_d testing would not begin for three to four months, until the field work was completed due to the winter weather. As a result, the current extension request estimates 16 months from the beginning of the K_d testing to submittal of the DP/ER while 14 months were estimated in October 2010. Thus, an additional two months is required to complete all of the tasks starting with the K_d study and finishing with the submittal of the DP/ER to NRC. The additional two months in schedule duration results from a combination of factors including:

- The laboratory testing time required may increase due to differences in the previous and new American Society for Testing (ASTM) methods (older method D4319-93 versus newer method C 1733-10);
- The 18-month delay in completing the fate and transport modeling (originally assumed at the October 2010 NRC meeting to be completed in January/February 2011 and now assumed to be completed in January 2013) requires identification of replacement Army contractor staff due to resignations and remobilization of remaining staff on the project after a long delay; and
- The Army's request that NRC review the site-specific K_d data prior to submitting the DP to avoid submitting an incomplete version. This request was not made in October 2010, but it is being made in this extension request due to the dependency of the K_d results on the fate and transport modeling.

To summarize, the Army is following the NRC-approved process for pursuing the termination of the license agreement. This is a new and so far unique effort, and is subject to NRC and Army agreement on the numerous details associated with the process. NRC concurrence and acceptance has been and continues to be sought in every step we take.

The extension is required because Army work on the site specific K_d testing was suspended for approximately twelve months until field sampling methodology was approved by the NRC. The Army's plan called for the NRC approval of sampling methodology and consensus of the samples to be selected by November 2010. The Army indicated its ability to remain on schedule was dependent on December 2010/January 2011 lab testing without having to recollect samples. Receipt of NRC approval in November 2011 required the Army to recollect the field samples with the earliest opportunity to do so being early spring 2012. The overall impact to the schedule is a 20-month delay over the December 2011 license requirement. The Army collected the samples during the final week in March 2012. Laboratory analyses will soon commence in May

2012 following the analysis of soil and water samples to total and isotopic uranium and other physical and chemical properties (e.g., pH, grain size, total organic carbon).

An additional schedule delay of 30 days was incurred due to the need to conduct lab tests over a 90-day period, instead of the originally scheduled 45 days.

References

ML042710122. Request for Details About Parameters Needed for Off-Site Transport Models for Jefferson Proving Ground. October 5, 2004.

ML050330496. Response from the Army About a Revised Environmental Monitoring Plan for Jefferson Proving Ground and Parameters that Cannot be Collected Due to the Presence of Unexploded Ordnance. January 31, 2005.

NRC. 2006. Consolidated Decommissioning Guidance, Characterization, Survey and Determination of Radiological Criteria, NUREG-1757, Volume II Revision I (I.6.4.4). September.

[Explain] that the extension presents no undue risk from radiation to the public health and safety, and why the extension is otherwise in the public interest.

The requested extension to the alternate decommissioning schedule for JPG presents no undue risk from radiation to the public health and safety and is in the public interest. This conclusion is based on the following considerations.

The extension is in the public interest because it will render the most accurate site characterization data from which the DP and ER will be developed. Submitting the DP without the site-specific K_d data will bring further delays and potentially more issues to resolve and develop proper course of action. Granting the extension also implies that the Army will maintain its oversight of the area to at least 2018, as opposed to its current plan to cease oversight by 2016.

JPG impact areas for DU penetrators also involved extensive testing of conventional high explosive munitions. As stated in U.S. Army 1995, "JPG officials estimate that approximately 23 million rounds have been fired into impact areas north of the firing line since 1941."

Accordingly, the Army restricts access to this area because of unexploded ordnance (UXO), as well as DU. Warning signs are present highlighting the potential hazards associated with both UXO and DU. In addition, physical barriers (eight-foot tall, chain-link fence topped with three, strand v-shaped barbed wire surrounding the facility) limit the potential for access into the DU Impact Area.

The Army tested DU penetrators at JPG against soft targets, so the penetrators proceeded downrange from the target, generally coming to rest in subsurface soils. The limited amount of DU present on or in surface soils necessarily minimizes the potential for inhalation or ingestion of the uranium by personnel and animal life and limits the material available for uptake by plant

media or for migration in surface waters. The large fraction of DU found in subsurface soils also tends to introduce additional distance and shielding to further limit already low external doses.

Given that DU penetrators employed at JPG were tested against soft targets, they were released to the environment as DU metal rather than being aerosolized and/or converted to a chemical form that could be more easily taken up by plants, ingested or inhaled by animals or personnel, or migrate in surface water or groundwater. Lengthy periods of time are generally necessary for the oxidation/reduction of the metal to a chemical form such that the DU can be taken up by humans, animals, or plants. During this time, the potential risks to public health and safety is consequently very low.

The Army believes that soils present at JPG tend to deter environmental migration of uranium within the impact area. However, completion of on-going scientific studies, such as determination of the site-specific K_d , will provide critical information with which to fully evaluate the potential for migration over the first 1,000 years after decommissioning, as Title 10, Code of Federal Regulations (CFR), Part 20, Subpart E, Section 20.1402 requires. Migration applicable to the interval of the requested schedule extension is addressed herein to demonstrate that the extension request does not present undue risk from radiation to the public health and safety as a result of off-site migration.

- The *Radiation Monitoring Report for License SUB-1435, Jefferson Proving Ground, Summary of Results for October 2010 Sampling Event* (NRC ADAMS accession number ML12032A116), provides insight with respect to the relative migration of DU over the period of interest applicable to the requested extension of the alternate DP schedule. The limit for ^{238}U in surface water is 3×10^{-7} microcuries per milliliter ($\mu\text{Ci/mL}$) (that is, 300 picocuries per liter (pCi/L)) with this concentration corresponding to a radiation dose of 50 millirem per year if a person obtained all drinking water from that single source (Title 10, CFR, Part 20, Appendix B). For comparison, 112 surface water samples were collected from eight sampling locations between 2004 and October 2010 exhibited an average total uranium concentration of $(0.96 \pm 2.8) \text{ pCi/L}$. This concentration is equivalent to about 0.16 mrem per year or 0.03percent of the 10 CFR 20 effluent limit. Similarly for comparative purposes, the average concentration of 142 samples from 11 groundwater monitoring wells from 2004 to October 2011 is $(1.4 \pm 1.1) \text{ pCi/L}$. This concentration is equivalent to a dose of about 0.23 millirem per year if all drinking water was obtained from this source without further processing.
- A statistical trend analysis of total uranium results was conducted for 142 groundwater samples from 11 monitoring wells; 112 surface water samples from 8 locations; 125 sediment samples from 8 locations; and 71 discrete soil samples from 4 locations. The associated coefficient of correlation is provided on applicable figures in the document with R^2 values that approaches 1.0 suggesting a strong relationship. The monitoring locations indicate no significant trend (that is, data does not reflect a statistically meaningful increase in any of the environmental data collected to date). In addition, no monitoring location exhibited trend lines with R^2 values greater than 0.5 (that is, somewhat significant). Based on the information noted herein, it is concluded that off-site migration does not present undue risk from radiation to the public health and safety during the period of the requested extension in the alternate

DP schedule. This is particularly true given that semi-annual environmental monitoring will continue during the proposed schedule extension such that off-site migration would be detected and addressed by the U.S. Army in a manner that would assure that there is no undue risk from radiation to the public health and safety.

- Given that DU used in military munitions contains about 99.8 percent ^{238}U , 0.003 percent ^{236}U , 0.2 percent ^{235}U , and 0.0006 percent ^{234}U by mass (Bleise et al., 2002) and that ^{238}U has a half-life of 4.47 billion years, DU exhibits a low specific activity (3.6×10^{-7} Ci/g) such that the long half-life in combination with the nature of the emissions¹ preclude the presence of a significant external radiation hazard. In addition, although the radiotoxicity of DU is 40 percent lower than natural uranium, the chemotoxicity of natural uranium and DU is the same.
- Given the lack of an external radiation hazard, potential public radiological health and safety considerations are limited to those associated with internal exposure to ^{238}U alpha particles² and to the beta emissions of ^{234}Th and $^{234\text{m}}\text{Pa}$,³ the two progeny radionuclides in secular equilibrium with the ^{238}U parent. About 98 percent of uranium entering the body via ingestion is not absorbed but is eliminated via the feces. As such, typical gut absorption rates for uranium in food and water are about 2 percent for soluble and 0.2 percent for insoluble uranium compounds (World Health Organization [WHO] 2003). Based on the presence of UXO, no portion of the DU impact area is used for the production of crops. As such, and given the lack of detectable uptake by deer (NRC ADAMS accession number ML073100096), DU ingestion presents no meaningful risk from radiation to the public health and safety.
- Although the fraction of the uranium absorbed into the blood is generally greater following inhalation of the same chemical form (WHO 2003), uptake varies considerably with chemical form and particle size distribution. With respect to chemical form, oxide forms of uranium commonly associated with the use of DU munitions (that is, UO_2 and U_3O_8) are assigned inhalation Class Y whereas other chemical forms are assigned classes W or D as appropriate. As such, material of the required particle size (mass median aerodynamic diameter) that is inhaled is retained in the lungs with a long biological half-life. For soluble forms of uranium that are “absorbed into the blood, approximately 70 percent will be filtered by the kidney and excreted in the urine within 24 hours; this amount increases to 90 percent within a few days” (WHO 2003). As noted above, at JPG DU is generally present in surface soils in limited concentrations, is present primarily in relatively insoluble chemical forms, and erosion of surface soils generally occurs over an extended period of time (for example, commonly modeled to be at least 100 years for the erosion of the 6-inch thick surface soil layer). As such, these factors serve to limit the potential risk from radiation to the public health and safety over the durations associated with the requested extension for submittal of the JPG DP. This is particularly true given the access restrictions at JPG to the DU Impact Area.

¹ Gamma rays with energies of 63 keV (3.5 percent) and 93 keV (4 percent) from ^{234}Th

² Alpha particles with energies of 4.15 MeV (25 percent) and 4.2 (75 percent) MeV

³ Beta particles with energies of 103 keV (21 percent) and 193 keV (79 percent) from ^{234}Th and 2.29 MeV (98 percent) from $^{234\text{m}}\text{Pa}$

- “Erythema (superficial inflammation of the skin) or other effects on the skin are unlikely to occur even if DU is held against the skin for long periods (weeks).” (WHO 2003)
- “No consistent or confirmed adverse chemical effects of uranium have been reported for the skeleton or liver.” (WHO 2003)
- “No reproductive or developmental effects have been reported in humans.” (WHO 2003)
- With respect to undue risk from radiation to the public health and safety, it is notable that “In case of uranium or DU intake, the radiation dose limits are applied to inhaled insoluble uranium-compounds only. For all other exposure pathways and the soluble uranium compounds, chemical toxicity is the factor that limits exposure.” (WHO 2003)

Based on the considerations provided herein, the Army concludes that approval of the alternate schedule for decommissioning extension presents no undue risk from radiation to the public health and safety. The extension is otherwise in the public interest because the proposed schedule extension provides the time needed to complete technical assessments especially with regard to development of site-specific K_d for the JPG site. These technical assessments will provide information vital to the effective decommissioning of the site while assuring compliance with “as low as reasonably achievable” criteria contained in 10 CFR 20.1003 and 10 CFR 20, Subpart E and avoiding the unnecessary expenditure of limited funds.

References

- Bleise, A., P.R. Danesi, and W. Burkart. 2002. “Properties, use and health effects of depleted uranium (DU): a general overview.” *Journal of Environmental Radioactivity*, Volume 64, pp. 93–112.
<http://www.iaea.org/newscenter/focus/depleteduranium/properties.pdf>. February.
- ML073100096. *Deer Tissue Sampling Results, Depleted Uranium Impact Area Site Characterization, Jefferson Proving Ground, Madison, Indiana*. Final. Prepared for U.S. Department of Army, Installation Support Management Activity, 5183 Blackhawk Road, Aberdeen Proving Ground, Maryland 21010-5424 and U.S. Army Corps of Engineers, Louisville District, 600 Dr. Martin Luther King, Jr. Place, Louisville, Kentucky 40202-2230. Submitted by Science Applications International Corporation, 11251 Roger Bacon Drive, Reston, Virginia 20190. August 2006.
- ML12032A116. *Radiation Monitoring Report for License SUB-1435, Jefferson Proving Ground, Summary of Results for October 2010 Sampling Event*. Final. Submitted to U.S. Nuclear Regulatory Commission, Washington, DC. Submitted by U.S. Department of Army, U.S. Army Garrison, Rock Island Arsenal, Rock Island, Illinois. March 2011.
- U.S. Army. 1995. *Final Environmental Impact Statement for Disposal and Reuse of the Jefferson Proving Ground*. U.S. Army Materiel Command (AMCSO). Alexandria, Virginia. September.

WHO (World Health Organization). 2003. Fact Sheet N°257. Depleted Uranium.
<http://www.who.int/mediacentre/factsheets/fs257/en/>. January.

In October 2009, the Army submitted Addendum 8 to its Field Sampling Plan (FSP). The Army should update its FSP and explain how this updated FSP will generate the site characterization information needed to support a decommissioning plan to be submitted within the extended timeframe. The Army should identify any deviations in scope and schedule to the activities identified in that updated FSP from the earlier FSP. For example, has there been a delay in the initiation and/or completion of previously identified tasks? If so, an explanation should be provided as to the reason(s) for the delay(s) and how they now impact the overall development of a decommissioning plan.

In October 2008, the Army collected the samples for the JPG site-specific K_d study as described in FSP Addendum 7. In December 2009, the Army collected the additional samples from the underlying glacial till formation described in FSP Addendum 8. Laboratory testing was not initiated using samples collected in 2008 and 2009 due to concerns expressed by NRC technical staff.

In March 2012, the Army recollected all the soils and water needed to conduct the site-specific K_d study. The approach for recollection was described in the Army's letter dated August 5, 2011 (NRC ADAMS accession number ML112340366), specifically in Attachment 2. However, one modification was made related to sampling depths based on NRC's concern in the November 2, 2011 letter (NRC ADAMS accession number ML113000306). This change was included in the Army's letter dated November 28, 2011, as follows: "To address the only remaining concern identified in the letter, the Army will collect soils other than the Pre-Wisconsinan Till from the 0 to 4 foot soil column depth." Since NRC was able to review and comment on the Army's approach documented in the August 4, 2011 letter and because the sampling was completed in late March 2012, the Army believes Attachment 2 in the 4 August 2011 letter meets the requirements for an FSP addendum and, thus, submitted it in lieu of submitting another FSP addendum to streamline the review process.

The contents of the Army's letter dated August 5, 2011 and the subsequent sampling conducted in March 2012 were based on discussions regarding the site-specific K_d study that occurred between the Army and NRC on numerous occasions for several years with ample opportunity for the NRC to provide input, as follows:

- **May 2005:** Army submitted *Field Sampling Plan, Depleted Uranium Impact Area Site Characterization, Jefferson Proving Ground, Madison, Indiana*, which included the general plans for conducting the site-specific K_d study
- **July 23, 2008:** Army presented Army's *Progress in Characterizing JPG and Plans for Upcoming Work* and discussed general aspects about the K_d study with NRC
- **August 28, 2008:** Army submitted FSP Addendum 7 for NRC review

- **September 24, 2008:** Army and NRC held teleconference to discuss NRC's comments/questions on FSP Addendum 7
- **October 16, 2008:** Army submitted revised FSP Addendum 7, which included revisions based on discussions during 24 September 2008 teleconference
- **November 6, 2008:** Army transmitted letter with proposed Standard Operating Procedure (SOP) and described some site-specific and uranium-specific analysis parameters to be used by TestAmerica, Inc. (Earth City, MO) in the K_d tests for NRC's review and approval.
- **July 23, 2009:** Army sent letter that addressed the following two questions from NRC about the site-specific K_d tests: (1) "How will the Army ensure that solubility limits, if exceeded, will not contribute to an overestimation of sorption?", and (2) "Which samples will be selected for the K_d study and what is the basis for their selection?"
- **August 27, 2009:** Army and NRC held annual status meeting and discussed the need to collect samples from the glacial till stratigraphic layer, which resulted in submitting FSP Addendum 8 in October 2009 and collecting six additional samples in December 2009 for site-specific K_d tests.
- **September 21, 2009:** Army submitted letter that corrected the list of samples submitted in 27 August 2009 letter.
- **October 16, 2009:** Army submitted letter that addressed NRC's question concerning the spatial distribution of proposed sampling locations where soil was collected to conduct the site-specific testing and included figures showing the locations where the proposed samples were collected.

Following the submittal of the October 16, 2009 letter (NRC ADAMS accession number ML0930701691), the Army and NRC discussed the K_d testing during teleconferences on November 19, 2009; January 21, 2010; and January 25, 2010. During these teleconferences, NRC clarified their concerns about the potential use of samples with excessively high uranium activity in the K_d testing. While NRC felt that it is desirable to evaluate sorption for a broad span of detected uranium activities, they remained concerned that exceeding solubility limits in the tests could overestimate sorption and, thus, underestimate residual radiation dose. The solution was to include some, but limit the number of, samples that exceeded previously documented testing limits (160 pCi/g), which was discussed in further detail in the November 6, 2008 letter. A second component of the solution was for the Army to provide additional supporting data from the laboratory tests (for example, uranium concentrations in aqueous solution over time).

In a letter to the Army dated March 10, 2011 (NRC ADAMS accession number ML110590609), the NRC identified concerns regarding rainwater representativeness, sample degradation, and uranium adsorption to laboratory glassware and made four observations (that is, use of desorption testing data in developing site-specific K_d , previously documented testing limits, solubility limits, and temperature requirements for alkalinity samples). The Army conducted ancillary laboratory tests in spring and summer 2010 for rainwater representativeness and sample degradation concerns. The results, which were presented in the Army letter to NRC dated August 5, 2011, failed to provide conclusive evidence that sample degradation had not occurred and led to the conclusion that re-sampling was necessary. A laboratory test will be performed after the completion of the K_d tests to evaluate uranium adsorption to laboratory glassware, which was the final NRC concern in the March 10, 2011 letter. The results will be included in future correspondence.

References

ML0930701691. Letter from Joseph N. Skibinski (Project Manager, Science Applications International Corporation [SAIC]) to Ms. Yolande Norman, Materials Decommissioning Branch, Division of Waste Management and Environmental Protection, Office of Nuclear Materials Safety and Safeguard, Two White Flint North, 11545 Rockville Pike, Rockville, MD 20852-2738. October 16, 2009.

ML112340366. U.S. Nuclear Regulatory Commission Staff Review of U.S. Army Responses to Staff Concerns on Site-Specific Partition Coefficients for the Jefferson Proving Ground (NRC License SUB-1435). March 10, 2011.

ML112340366. Army Responses to 10 March 2011 Letter from Mr. Dominick Orlando, U.S. Nuclear Regulatory Commission, Materials Decommissioning Branch, Division of Waste Management and Environmental Protection, Office of Nuclear Materials Safety and Safeguard. August 5, 2011.

ML113000306. Response to Army on JPG K_d Test Plan. November 2, 2011.

Explain why any extension request, if granted, would satisfy the requirements of a categorical exclusion provision and not require additional environmental review beyond what is currently called for in the license, consistent with the NRC's regulation at 10 CFR 51.22(c)(14)(xv), or failing that, submit an environmental report pertaining to the extension request.

Because under an extension to the original decommissioning schedule the Army will continue to "possess" the DU within the controlled access grounds of the Army-owned JPG facility and because an extension presents no undue risk from radiation to the public health and safety and is otherwise in the public interest (as described below), the categorical exclusion at 10 CFR 51.22(c)(14)(xv) applies to the Army's request for an extension to the original alternate decommissioning schedule. The NRC completed an Environmental Assessment (EA) with a Finding of No Significant Impact (FONSI) (NRC ADAMS accession number ML053130257) and a Safety Evaluation Report (SER) on April 26, 2006 (NRC ADAMS accession number ML053320014) that supported the original Army request for an alternate decommissioning schedule dated May 25, 2005. The NRC EA evaluated and analyzed the potential environmental impacts and radiological exposure to the general public of the original proposed alternate decommissioning schedule that included the following Army proposed site-specific characterization field activities: biota (deer) sampling, fracture trace analysis and electrical imaging of the hydrogeology, installation of at least ten multi-level well clusters, soil verification, precipitation monitoring, installation of equipment for stream and cave spring continuous stage gauging, collection of soil samples, surface soil scans (gamma walkover scans), collection of sediment samples from two major creeks that traverse the DU Impact Area, collection of DU penetrators for corrosion and dissolution analysis, and collection of soil and rain water media for the determination of the JPG site-specific K_d .

Since the NRC approval of the original Army request for an alternate decommissioning schedule, the following site-specific characterization activities have been completed by the Army:

- Biota (deer) sampling, analysis and reporting
- Fracture trace analysis and electrical imaging of the hydrogeology
- Installation of 22 multi-level well clusters in preferential groundwater flow paths
- Quarterly sampling and analysis of uranium from 43 groundwater monitoring well samples
- Installation of equipment for continuous stream and cave spring stage gauging; manual stream and cave spring flow measurements and reporting
- Quarterly monitoring and reporting of the groundwater, stream, and cave water-levels/-stages
- Soil verification
- Precipitation monitoring
- Soil sampling and surface soil scans (gamma walkover scans)
- Collection of sediment sampling from the two major creeks that traverse the DU Impact Area
- Aquifer testing for hydraulic conductivity (that is, slug tests)
- Collection and analysis of DU penetrators for corrosion and dissolution
- Groundwater age-dating from the till and carbonate bedrock hydrogeologic units conducted by U.S. Geological Survey (USGS)
- Resolution to the NRC comments and questions for the determination of the JPG site-specific K_d , including utilization of the new laboratory testing procedure, American Society for Testing (ASTM) C 1733-10 and re-collection of soil, rain water, and groundwater media for the determination of the JPG site-specific K_d for use in the fate and transport modeling for the facility.

Not only were all of these field work and laboratory tasks completed, but the Army added several additional tasks/field work items that increased the information available for the site-specific characterization of JPG. This demonstrates that the amount of work and related time remaining if the extension is granted is small when compared to the five years originally approved and, therefore, decreases the need for an additional EA for this extension to the alternate schedule for decommissioning for JPG.

Since the NRC approved the original Army request for an alternate decommissioning schedule, the following additional analyses concerning DU at JPG have been completed and reported to the NRC:

- No DU was detected in the biota (deer) sampled and analyzed
- Statistically significant DU was not detected in the 88 samples over 4 sampling intervals of the 22 additional groundwater monitoring wells or in 66 surface water, 88 sediment, or 44 soil samples collected, analyzed and reported to the NRC in the 11 semi-annual monitoring events since April 2006.

Amendment number 13 to the JPG DU license number SUB-1435 issued by the NRC on April 26, 2006 approving the original alternate decommissioning schedule and all subsequent

amendments to this license have continued to specify that, since the NRC amendment to SUB-1435 of August 29, 1994, the JPG DU license is for "possession only...." Thus, license termination is required, site characterization is needed to terminate the license, and "possession" of military munitions DU falls within the first category listed in the categorical exclusion of 10 CFR 51.22(c)(14)(xv).

As additional support of the applicability of the categorical exclusion of 10 CFR 51.22(c)(14)(xv) to this request, the NRC has stated in NUREG-1748 (NRC 2003), Section 2.2.7.15 and 49 Federal Register (FR) 9379 (March 12, 1984):

Possession, manufacturing, processing, shipment, testing or other use of depleted uranium munitions, for example, bullets and other projectiles, includes about 10 licenses held by U.S. military organizations and less than 10 licensees involved with the manufacturing process. The military tests involve the use of low specific activity depleted uranium (3.6×10^{-7} curie/gram) as metal alloy penetrators (rods) which vary in weight from a few grams to less than 10 kilograms. These rods are propelled at high velocities against metal targets such as armor plate. Testing of these munitions is carried out at remote desert locations on military reservations, in constructed enclosures, or over deep ocean waters. Any materials released to the environment are of low radioactive content, are highly dispersed, and are of chemical and physical form which is not readily incorporated into flora or fauna. Thus, radioactive releases to the environment which could affect human, animal or plant life from testing at any of the locations are negligible and occupational exposures from handling depleted uranium are so low that personnel monitoring is not required. Additionally, since the penetrators tested do not explode, cratering or other defacing of the environment is not experienced. The military also transports and stores depleted uranium munitions for war-readiness posture. Because the munitions are transported and stored in sealed containers as solid metal in nondispersible form, there is negligible environmental impact associated with such transportation and storage.

To ensure that the possession only requirement of the JPG DU license SUB-1435 is being complied with and that the categorical exclusion of 10 CFR 51.22(c)(14)(xv) remains applicable, the Army will continue the semi-annual groundwater, surface water, soil and sediment sampling, analysis, and reporting in accordance with the Environmental Radiation Monitoring Program (ERMP) to the NRC during the requested alternate decommissioning schedule extension period.

No physical access to the JPG facility, security control measure for the facility, or known radiation exposure pathways have changed since the NRC completed their original EA and FONSI for the approved original alternate decommissioning schedule (NRC ADAMS accession number ML053130257) that might have required a supplemental NRC EA for this extension request of the original NRC approved alternate decommissioning schedule.

References

- NRC (U.S. Nuclear Regulatory Commission). 2003. Environmental Review Guidance for Licensing Actions Associated with NMSS Programs. NUREG-1748. Final Report.

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