From: geomike5@att.net
To: Snyder, Amy
Subject: comments on March 24 NRC/Army meeting
Date: Thursday, April 09, 2015 9:50:02 AM

Ms. Amy Snyder, Senior Project Manager
Material Decommissioning Branch
Mail Stop T8-F5M
U.S. Nuclear Regulatory Commission
Washington, DC, 20555

Dear Ms. Snyder,

I appreciated the opportunity to listen in on the depleted uranium (DU) possession license (SUC-1593) discussion meeting between the Army and NRC on March 24, 2015.

I think it was a very productive meeting in reducing confusion about what was expected for addressing various technical issues and providing clarity on the licensing process. I applaud your tenacity and that of your team in standing firm in requiring details and supportive information for various aspects of the licensing procedures.

I provide some general commentary on concerns that exist from this and previous meetings, principally dealing with the monitoring for DU at the Hawaiian training areas but applicable to all sites. There is a sense that the Army does not feel that monitoring for DU is in its best interest. That is certainly plausible in that if they find DU, particularly airborne DU, it has moved or is moving from their Radiation Control Area (RCA). Then they will have to do something about it and that involves their time and expense. Yet, the Army provides an estimate to clean the RCA of DU and for Hawaii Pohakuloa Training Area (PTA), it is a modest $67 million for the 8.9 km2 (ADAMS ML15078A099 (Decommission Funding Plan)). Another alternative is to sequester the RCA completely from any use; given the size of PTA (538 km2), that is a small area for withdrawal.

I have not listed references here as information can be found on-line. If you would like some references, for example the uranium concentration of Hawaiian basalts, for example, please let me know and I will compile a list.

Regards,

Michael Reimer, Ph.D., retired geologist
GeoMike5@att.net

<u>On the Generic Overview</u>

The Army approach in working out a process with a generic overview for modeling,

seeking conservative estimates of exposure is interesting, but possibly it may only result in an academic exercise. There are many similarities in boundary conditions that can be noted. For example, Fort Carson, Colorado and Pohakuloa Training Area (PTA) in Hawaii are both at a high elevation, have similar yearly precipitation amounts, and have dry, mountain-influenced high winds often exceeding 70 mph. Yet the rock base and hence soil cover is very different. Fort Carson soils are derived from granite and granitoid rocks uplifted during the Laramide Orogeny about 70 million years ago. Soil profiles are continuously forming and uranium location is often controlled by the chemistry of the profile. The soils of PTA are derived from thoelitic basaltic eruptions of Mauna Kea and Mauna Loa, which are just 300,000 years old for the former mountain and still continuing for the latter. For Mauna Loa, there is not much soil and full profiles have not developed. Granite's natural background uranium concentration is 2-3 ppm whereas the Hawaiian basalt uranium concentration can be 10 times lower at 0.3 ppm or less. The younger soils may be close to secular equilibrium and reflect the host rock concentration of trace elements including uranium isotopes, but the chemistry of soil development over millennia may impact the uranium isotopic equilibrium of soils derived from the granite batholiths (Fort Carson). Rhetorically, what would be a relevant value of background radiation to enter into a generic model?

The reason for that discussion is simply to demonstrate that in developing a generic model, one size may not fit all. There are models other than RESRAD that can be considered such as those developed by the U.S. EPA, for example, on radon inhalation and as published by ICRP (ICRP-66)] on plutonium.

Your request to the Army to provide details and supporting information for its derivations is very astute. The document, Programmatic Approach for Preparation of Site Specific Environmental Radiation Monitoring Plans (ADAMS ML 15078A114, here-in-after called the "Report"), notes in Section 3 that Dr. Robert Cherry calculated for PTA what would be the radiation level if all of the spotting rounds thought to have been used at PTA were distributed in the top 15 cm of soil at the RCA. It suggests that any DU adds very little to the background. Not knowing what value Dr. Cherry used for background uranium, or if he considered only soil (not rock) for the top 15 cm of cover, creates a problem in interpretation. As noted above, it could be that the background of the RCA is but a fraction of the radiation from the Davy Crockett devices. There should be clarification that the specific calculation was made with probable values of soil uranium consistent with the host rock U concentration and the process of developing soils.

<u>On Migration Distances of Respirable DU.</u>

On the distance of movement of DU particulates from its emplacement at the RCA, I do not feel that total consideration is given to the probable nature of the particles. The common mantra by the Army is that the fragments move very little distance from an impact site. While the large fragments may be displaced on the order of centimeters to meters, the dust size and the aerosols, including the respirable aerosols, may be displaced 10s of kilometers from the site. It is well documented that dusts from the Sahara are transported regularly to the Caribbean and dust from

the Mongolian desert is transported to Hawaii and beyond. On the distance of transport, there is the classic case involving a manufacturing facility dealing with DU fabrication in Colonie, NY. There, DU was found over 5 km from the factory (Lloyd et al., The distribution of depleted uranium contamination in Colonie, NY, USA: Science of the Total Environment, v. 408, p. 397-407). Other reports indicate transport of up to double this distance or greater.

Very few spotting rounds have been found at the PTA RCA. This is not surprising in that for over 40 years, that area has been used for active firing of munitions including the presence of personnel and vehicular traffic to areas where unexploded ordnance was considered not to be a problem. It is very likely that the DU-form today is highly pulverized and subject to more rapid oxidation and transport than larger pieces of DU. The movement of dust and aerosols depends on the size of the particulates and the transport mechanism. Resuspension does not require too much energy, certainly much less than close impact of a high explosive (HE) projectile. Here I consider the normally used definition of HE to be something provided by a 155 mm projectile. I believe smaller explosive devices should be considered. The energy of a walking person can exceed that required to bind an aerosol to rock or soil. In fact, wind and temperature changes are often enough for resuspension.

As part of the licensing process, there has been an eyewitness report submitted to NRC by Mr. Jim Albertini that dust devils formed over PTA reached several thousand feet in height and moved several miles including intersecting his observation site at Mauna Kea State Park where he and several other people were making background radiation measurements. These observations confirm that dust is moving out of the RCA.

<u>On Plant Collection.</u>

I believe Mauna Kea State Park is a possible site for lichens and mosses. As noted in the Report, published literature shows lichens favorably incorporate airborne materials in their structure including DU. This would be an ideal place for the Army to have samples collected and analyzed for DU. Perhaps the reasoning that other plants should not be sampled allows an exemption, due to low density of foliage, but there are occasional grass fires that allow smoke to be sampled. Sampling of lichens and moss for DU would possibly give an indication of DU migration.

<u>On Previous Air Monitoring.</u>

The Army had issued a contract for several years of air monitoring. This was noted in the teleconference by Dr. Cherry as one additional data set to be used for modeling, referred to as the Morrow data. I had the opportunity to talk to Dr. Morrow and found him to be very knowledgeable and competent. He noted to me that he was restricted in what he could do by his contract and the important issue is that he was looking for uranium and not depleted uranium.

Based on Dr. Morrow's work and the contract limitations, the claim could be made that nearly all the uranium on his air filters was DU. While that claim could be

characterized as highly ludicrous, it cannot be refuted. Therefore, I am pleased to observe that the new air monitoring seems to be designed with proper filter pore size, sampling time length, counting times, and may include critical events such as wind storms and brush fires and be focused on analyzing for DU and not just total uranium. You are probably aware that the current thought when collecting air samples is to include a size analysis for the particles. This provides important information on the fate of inhaled particles.

<u>On the Recent Finding of Shallow Groundwater.</u>

On the issue of monitoring ground water, when the ground water table was thought to be on the order of 4,000 to 6,000 feet, it was a reasonable assumption not to be concerned about DU contamination. However, recent drilling contracted by the Army and using the oversight of Dr. Donald Thomas of the University of Hawaii in Hilo, discovered ground was also at much shallower depth. From the one well it was likely that this encounter was a perched water table but one of sufficient size to provide potable water to PTA. Currently, PTA trucks in potable water a cost of $2 million a year. My understanding is that additional wells will be drilled. I note that a comment on this discovery by the Army was that any potable source of water would be tested per EPA standards for contamination of various materials. This is not a sufficient response. EPA does not have a water standard for DU. The NRC license deals with DU. Therefore, the analysis should include DU.

<u>Sufficient monitoring.</u>

My primary concern is that there appears to be an evasion to look for DU. There is no reason not to look for DU. Of course it is not in the best interest of the Army to find it, especially if it is outside the RCA and even off the training area. I use the mantra, “if ye do not seek, ye shall not find.” It is easy to design a program that minimizes the chances of finding DU. The following is an example. The Draft radiation Safety Plan (ADAMS ML15078A118) discusses a monitoring technique that would be performed on soldiers exiting the RAC. Measurements would be made with a Geiger counter fitted with a pancake monitor (Fig 17.1 and 17.2) and used to scan the soldier’s boots. What level of DU would be expected to be found by such a technique?

The general approach is to lump together DU and natural U and upon finding some minimal level certain to be above a DU concentration, state that the overall concentration (activity) is lower than permissible world standards for uranium exposure, therefore there is no increased health risk. This approach is unreasonable and avoids looking for DU.

A more cogent approach would be to use personal air monitors so that the dust would be captured on an appropriate pore-sized filter Not only could the devices be given to selected soldiers but could be affixed to motorized transport vehicles, including helicopters. The major problem here is that there could be so much dust generated it would clog the filters in a short time, a mere fraction of a full day.

What about some of the common write-offs? Ground water? It is too deep. Plants? There are few plants in the RCA. But now ground water is found shallower than expected and lichens have been demonstrated to preferably collect DU. Uranium, because it is a heavy element, will not travel far or even out of the RCA. That latter statement is a great example of misinformation spin. Part of it is true, uranium is a heavy element, but to link it to the conclusion of short transport distance is nonsense.

The Public's Right to Know.

The public, as you know, has a great fear of radiation exposure. In this situation, many outspoken members have suggested and even offered to participate in a monitoring program. They are concerned not only for their own health and that of their families but also for the soldiers and the employees, civilian and military, stationed at PTA and Schofield. Soldiers are placed in harm's way when sent to foreign battlefields; the concerned citizens of Hawaii want to minimize the soldier's risk at a home base, too. There is as much potential for those individuals to be placed in harm's way from DU exposure locally as there is in battlefield incidents.

It is easy to design a monitoring program that gives the appearance of appropriateness but does little to capture the true issue. It must be noted that for PTA and Schofield Barracks, $68 million and $42 million have been estimated for cleanup (ADAMS ML-15078A099). A cogent monitoring program would be but a fraction of that cleanup cost, even if it included specific monitoring of employees.

If the monitoring is done correctly for DU, then it is possible the current claims of no-risk or minimal risk given by the Army can be supported. The NRC does not get accused of being in league with the Army, the Army does not get blamed for promoting a cover-up, and the public gets factual information that addresses its concerns. Please stand your ground in reviewing that a proper and adequate program is emplaced.