From: Mike Reimer
To: Snyder, Amy
Subject: [External_Sender] Comentary on Final ERMP for Materials License SUC-1593
Date: Wednesday, December 07, 2016 3:57:19 PM

December 7, 2016

Ms Amy Snyder
Division of Decommissioning, Uranium Recovery, and Waste Programs (DUWP)
Office of Nuclear Material Safety and Safeguards (NMSS)
U.S. Nuclear Regulatory Commission (NRC)
Washington, D.C. 20555

Dear Ms Snyder:

I reviewed the documents of September 2016,

Final

Site-Specific Environmental Radiation Monitoring Plan

Pohakuloa Training Area, Hawaii

Annex 17

For Materials License Suc-1593,

and

Final

Programmatic Uniform Federal Policy–Quality Assurance Project Plan (Ufp-Qapp)

Annex 19

Environmental Radiation Monitoring Program,

noted as being part of ML16265A221.

They were submitted by the U.S. Army and I have some comments that I hope you will

seriously consider in your technical review and then implement in order for the program to have any merit at all.

There is of course the continued erosion by the Army of their obligation for responsible management of DU at the Pohakuloa Training Area (PTA), Hawaii. Years ago, there was a rigorous monitoring plan proposed. It has all but disappeared. Now, for Pohakuloa, it is proposed that there be only one sample location for monitoring. Really? There is not even a background or reference site proposed even though there is one for Schofield on Oahu (Annex 18).

It is truly unfortunate that NRC is getting pulled into this line of avoidance of responsibility. What that creates is endorsement of a junk monitoring program. There are numerous residents and officials who are genuinely concerned that DU at PTA has the ability to migrate and pose a measurable health risk. We discussed this before. People in general have a genuine fear of radioactivity. To them, there is a real risk from exposure of any magnitude. Trying to squeeze DU into the same category of exposure risk as naturally occurring uranium is bogus. Claiming that uranium is such a heavy element it cannot migrate far from its source is absolute nonsense.

The least understandable scenario is that although the Army claims there is no measurable risk, it refuses to conduct simple, comprehensive, and effective monitoring to substantiate that claim and attempts avoidance with NRC approval. With the recalcitrant attitude of the Army and because of NRC sanction of management avoidance, to the populace, the risk is real.

A genuine program is so easy to implement and after a few years, the issue could be settled. There is no detriment to the training programs, no soldier is placed more or less in harm's way, and the citizenry, Island residents, and visitors, soldiers and employees of PTA could feel secure that all that could be done for monitoring has been done, in a direct, proper, substantial and convincing manner.

Sincerely,

/s/

Michael Reimer, Ph.D, Geologist, retired

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Comments on Environmental Radiation Monitoring Plan prepared by the US Army for Pohakuloa Training Area, Hawaii.

Commentary by Michael Reimer, Ph.D., Geologist, retired

December 7, 2016

Introduction:

It is known that depleted uranium (DU) is present at Pohakuloa Training Area (PTA). It will probably take years before the risk of exposure to DU is resolved through a comprehensive study. Providing proper background information collected at this time will greatly assist in the risk studies of the future. Locally, the issue seems to be whether or not DU migrates from PTA, in particular, from the Radiation Controlled Areas (RCAs) that have been identified there.

The program designed and presented by the U.S. Army will not answer that issue. The proper approach would be to do whatever is practicable to discover if DU has migrated within or off the training area. As designed, the proposed program will not provide any information on the migration issue. In fact, it is designed to specifically avoid finding DU migration. The primary transport vector for individual exposure is inhalation and that involves air transport. Yet, specifically avoided in the monitoring plan is air monitoring. I am preaching to the choir. The NRC knows that to be true.

I have no doubt that the NRC staff is cognizant of the many misstatements and over characterizations of the Army proposed plan so I will only point out a few of the most egregious.

ERMP Sampling Procedures:

The proposal to use a single sample site at PTA for collecting sediment samples from a location identified as in the direction of stream flow is absurd. Sediment is an amalgamation of all the material transported by numerous feeder conduits (streams) in a drainage area. In effect, any sample will be highly diluted with background material from many areas, not just the RCAs (radiation controlled areas). The 234/238 U ratio can vary greatly in a natural setting. The ERMP states they will define depleted uranium as an activity ratio of 238/234 uranium greater than 3. At a minimum, scores of samples in and around PTA should be collected to measure this natural variability. Many should also undergo ICP-MS analysis for comparison and 236U should be included in the analyses.

There must be a full characterization of the drainage basin proposed for that single sample, taken quarterly. How does that particular site represent drainage from the RCAs? How are the tributaries, gullies, rills and streams connected through first, second, third order branches and beyond? What percentage of the sediment being sampled from that single site is derived from the RCAs?

From the figure shown in figure 2 of Annex 17, the arrows representing general drainage flow direction indicate nothing that may even intermittently flow through the RCAs to the sampling site. In other words, without further documentation, it is possible that the sediment sample does not represent any material from the RCAs.

It seems odd that sediment will be the sample of choice after a protracted commentary is presented on why surface water will not be collected.

The proposed sampling methodology presented in section 3.2 of Annex 17 is contradictory to standardized methods that would represent reality to minimal standards of quality assurance and quality control. Reference is made to Annex 19 and HASL 300. Annex 19 is largely a collection of data control sheets in which 17, 18, 19, perhaps 20 and 30 deal with sample collection and most important fields are marked TBD (to be determined). Most also present no sampling methods and refer back to the EMSP, in other words, a dead-end loop. From the copy of HASL-300 I was able to download, it contained no methodology for sediment sampling as proposed at PTA and for uranium analysis, it included a section U-04-RC on sample preparation for fluorimetry. (An alpha spectrometry method wsa given for urine analysis in U-01-RC.) It does suggest core sampling and confirms that open-field sediment sampling is not reliable because any sample is likely diluted by material from regions of non-interest.

The ERMP for Pohakuloa, annex 17, section 3.2 contains a list of 9 elements for a sediment sampling plan. I ask that you review them.

An introduction states that a sample for analysis is going to be a composite sample from 10 areas in the stream bed. Dilution is guaranteed!

Element 2 of the sample procedures says a sufficient sample should be collected for QA/QC purposes. What is a sufficient sample size? There must be some consistency, especially among the subset of 10 samples comprising the composite sample otherwise subjective bias is further introduced.

The composite sample will be placed in a sealable plastic bag (element 3). From this bag, it is stated that rocks, pebbles, leaves, and large twigs will be among debris picked out (element 4). How is debris defined? In standard sediment-size characterization, "rocks" is not a category. Pebbles range in size from 16 to 64 millimeters as would not pass through an appropriate-sized sieve. Cobbles range from 64 to 256 mm, and boulders are greater than 256 mm. Below pebbles in decreasing size are gravel, sand, silt, clay, and colloids, the latter representing particles less than 1 micrometer in size. This mischaracterization cannot be considered an oversight, but simply part of the trivialization of a sample collection procedure.

Element 5 is rather curious. It states that if water is contained in the sediment, the sediment will be allowed to settle and then the water poured off. Critical detail is missing. For how long will the sediment be allowed to settle? Seconds, minutes, days? How about using a centrifuge? The finer particles are likely to be suspended in water for a long time, and colloids, the size most likely to contain DU and DU oxide particles, will not settle but remain in the water phase, the phase that is to be discarded by the ERMP sampling technique. Permit me to state this in common understandable terms: the baby will be thrown out with the bathwater!

At a minimum, the water should be collected separately and analyzed for DU. Proper procedure should be used so that the colloid material remains in solution and is not separated out by surface charge attraction, say to the surface of the plastic container.

Element 6 of this procedure states that the sample will be homogenized by hand mixing it together in the plastic bag. It does not take a rock scientist to know that such a maneuver will never achieve homogenization in a sample with even moderate particle size difference. Maybe it will work for jelly beans but not for unsorted sediment. There are devices available, usually called sample splitters, that have a better chance of homogenizing a sample.

Element 7 is to fill the appropriate sample containers. As the sampling process indicates, the sample containers from any one site will not contain representative sample so that replication or duplication of any analysis will be impossible.

Element 8 states the sample location will be marked with a stake. I would recommend that the "stake" should be equivalent to a surveyor's marker that includes a unique sample identification number and is semi-permanent (until intentionally removed) and that number can be referenced so that any future collector will be able to note where a current sample should be collected. One might hope a sample collecting team would be equipped with an electronic retrieval notebook of some form that would provide such information.

Element 9 states: *Additional details of the sediment sampling and the field procedures are provided in Annex 19.* As indicated previously, they are not.

There is nothing specific to the preparation of the sample prior to analysis (see discussion above concerning HASL-300). The laboratory doing the work, or preferably multiple labs, should be identified. Will the analysis involve a fraction of the sample, will it be sorted by particle size, will it be a full digestion and the analysis beof a solution? The answers to these and numerous other procedure questions are not present in the ERMP. Further, there is no information on quality of sample analysis including accuracy and precision. It is not presented how many times a sample will be run, if there are duplicates, standards or blanks. As it stands, the ERMP as presented to you is woefully inadequate.

The trivialization of the sample collection procedure and avoidance of analytical details is representative of the frivolous nature of the entire ERMP and representative of the intent not to locate DU. If you do not seek, you shall not find. And that is the tenant applied to this program. I ask that NRC not fall victim to this corruption of scientific procedure to suit the objective of never finding any DU.

<u>Sample analysis</u>:

There is very little detail given how the sample analyses will be performed. The specific lab procedures from the chosen analytical lab should be included or at least referenced. For example, it is unknown how the sample sent to the lab will be prepared for alpha spectrometry. Will it be the sediment sample (solid) or a dissolved sample (liquid), or a chemically processed sample? How will self absorption be treated? What is the protocol for using standards, replicates, duplicates and blanks? Too much information is missing to approve this plan.

Water sampling:

There is an interesting contrast between Schofield and PTA in reasons why ground water is not being sampled.

There is a protracted discussion concerning the porosity of the ground at PTA about how precipitation rapidly percolates into the ground and rarely, except in extreme downpours, is surface flow created. At Schofield, in contrast, regular precipitation creates numerous intermittent streams and because the ground is less porous, the water does not percolate to the ground water table. The actual limiting condition is probably a scarcity of wells even though there is drilling for potable water sources at PTA and perched water tables have been found. But the reasons are more excuses not to sample ground water rather than sample access. Whenever ground water is encountered and if wells are available, ground water should be collected.

For surface waters, whenever available, they should be collected. In other words, during precipitation events that produce stream flow at the sediment collection sites, ground water should be collected. The reason is because the flowing water might carry in suspension the nanoparticles of DU and DU oxides that may be present.

The ERMP for Pohakuloa does note a standing body of water 4.5 miles from PTA. Sediment samples could be cored from this ponded area. HASL 300 does cover such sampling and analysis. It could provide an interesting historical record.

Erosion events triggering sampling:

The ERMP states that if a RCA site is noticed to have eroded to the extent that 25 square meters has lost 2.75 cubic meters of material, then that will trigger a sampling event. The likelihood of such an event in the environments at Schofield and PTA is improbable. Think of that quantity. A moderate-sized house may have a living area of 25 square meters, about 13 feet by13 feet. Now fill it with 6 inches of dirt. It would take torrential rains and headward erosion of deep soil-profile gullies to product that amount of erosion. But that topographical environment does not exist at the Pohakuloa RCA sites.

The most typical form of soil erosion at PTA is caused by winds. I am sure your staff has seen

photos of the dust storms produced by winds at PTA, carrying soil particles thousands of feet into the air and to distances well beyond the boundaries of PTA. That is why air sampling must be part of the monitoring protocol. Erosion always occurs when strong winds are blowing at PTA.

Because of the paucity of stream flow, it is very likely the chosen sampling site will not be refreshed by water borne sediment between sampling intervals.

The primary transport of DU is going to be by an airborne mechanism. That must be included in environmental monitoring. There is mention of a standing water body 4.5 miles from PTA. That should be sampled, including sediment cores that can provide excellent record of history of deposition environment. In addition, mosses and lichens can be sampled.

Ground fires:

In short, air monitoring downwind of grass fires at PTA should be mandated, whether or not the fire is at an RCA.

Model that had proven to work:

There is an example of monitoring that works. It was in place at Rocky Flats, Jefferson County, Colorado. It involved numerous stakeholders, federal, state, corporations managing Rocky Flats, and included the regional population.

RESRAD:

Although RESRAD is a very eloquent model involving a hypothetical resident farmer, it is not fully appropriate in the situation at PTA where there is likely a very specific exposure

route.

Tell me, if you would, what is the total radiation dose to adjacent lung cells from several 40 nanometer diameter DU particles lodged and not cleared in the lung for our mythical RESRAD farmer? The EPA models of local cellular exposure involving radon progeny may be more appropriate.

Take a 40 nanometer DU particle and put it in a 100 gram sediment sample and tell me you can detect it with whole sample alpha-spectrometry especially at a 234/238 ratio of 3 within a background ratio of 1. Provide a calculation on how much DU would be required to indicate that ratio in various sample sizes. I think the answer might be enlightening.

Sampling frequency and assignment to an individual of that task:

The sampling should be a full time job in order to ensure that the procedures are done properly and that important observations about the sampling site can be recorded and adjustment to procedure, if necessary, can be properly made.

Summary:

In sum, I ask that NRC reject the ERMP for Pohakuloa. Hawaii Island is an environment different from most of the other sites. One approach for all sites does not fit the Hawaiian environment. I recognize NRC must feel some pressure to approve the plans submitted by the Army, especially after many years of back and forth discussion, but reconsider them and do not simply rubber stamp them, especially those for Hawaii. If you are going to approve a plan, then at least for the sake of NRC's reputation have the decency to approve a proper plan, not one that is full of oblique sampling procedures, missing analytical descriptions, and mischaracterized justifications.