WAIKI`I · RANCH
HOMEOWNERS' ASSOCIATION

DEPLETED URANIUM REPORT

In 2005, a civilian contractor discovered spent depleted uranium (DU) munitions at the Schofield Barracks firing range on Oahu. Subsequent surveys by the Army, also found spent DU munitions at Pohakuloa Training Area (PTA) on the "Big Island" of Hawaii. The DU munitions had been fired in the 1960's.

The Army is required to remove the fragments of DU under the supervision of the Nuclear Regulatory Commission (NRC). The Army has done a survey of the entire firing range, and isolated those areas where DU fragments have been found. They have also implemented an air monitoring program, with several stations located around the borders of PTA.

Depleted uranium is the leftover uranium after the fuel and weapons grade isotopes of the metal are removed during the refinement process. It is 40% less radioactive than the naturally occurring metal, and emits low energy alpha particles. DU is very heavy and dense (more than lead), and is used for projectile type weapons and other industrial uses where an extremely dense and heavy metal is needed. In its solid form, it is not considered dangerous, as the low energy alpha particles will not penetrate skin. If it is vaporized or reduced to small particles and ingested into the body, the alpha particles can do tissue damage over time. Since it is a heavy metal, it is persistent in the body when ingested (much like lead).

Waiki'i Ranch is the closest civilian community to PTA. The prevailing surface wind blows directly towards the Ranch from the areas where the DU fragments are located, some 8-10 miles away. The immediate two questions that concern us are:

1. Have particles of DU become airborne due to weapons impact in the area of the DU fragments?

2. Have particles of DU traveled downwind to our community, and have we ingested those particles?

We asked the Army to put one of the air monitoring stations on the Ranch. We also asked them to implement a joint access and joint custody arrangement when collecting the dust samples from the filters. Our reason for this request was to insure a high level of integrity of the process. The Army did not respond to our request.

At this point, our Board of Directors asked me to do research and determine options to find out if Waiki'i residents had been, or are being exposed to DU.

The first step was to find an independent laboratory that has the technology and equipment to detect and measure very small amounts of DU in a sample. The laboratory that has the best reputation and experience level (in our opinion) is the NERC Isotope Geosciences Laboratory, located in England. I made contact with Professor Randall Parrish at the lab, and we discussed methods for determining our exposure level (if any).

The method agreed upon as being valid was to find a building exposed to the prevailing wind, and take dust samples from a rain sheltered area of the building. We selected our polo pavilion, which is an open sided building exposed to the wind from PTA. The interior beams of the building have never been washed, and have a 20 year accumulation of airborne dust.

The Ranch Manager, Walter Puhi, and I jointly collected a sample of dust from the building, and split the sample into two portions. I sent one portion to the Geosciences Laboratory, and Mr. Puhi retained the second sample in his custody in case there is ever any future question as to methodology or integrity of the tests.

The test, which has the capability of detecting even the most minute amounts of DU indicates that any DU in the sample is at the very lowest level of detection possible with present day equipment. Hawaii rock (and dust) contains a minute trace of naturally occurring uranium. The DU level of 1/100 the level of naturally occurring uranium in the sample indicates only a trace within a trace. The level of DU in the dust sample is so low as to be statistically insignificant. Please see the details in the laboratory report.

From this we can conclude that we have not been exposed to DU. Since Waiki'i Ranch is the closest community to the source, it also is unlikely that any other inhabited areas of the Big Island have been exposed.

David L. Bigelow

David L. Bigelow July 10, 2008

Waiki'i Ranch Depleted Uranium Project Manager

Waiki'i Ranch Homeowners' Association

Nat'l Env Research Council
Swindon, England

Report on Uranium Isotope Analysis

For the attention of:
David Bigelow

8 July 2008

I apologise for any delay, but I am pleased to now provide you with a uranium isotope analysis and concentration of the sample you submitted.

Conclusion in lay terms

The analysis of dust submitted contains a maximum of 1% Depleted Uranium as a proportion of the total uranium in the sample. The uranium in the dust is less than 1 part per million, a value that is typical for rocks that would occur in Hawaii. The uranium contained in the dust sample is overwhelmingly or entirely dominated by this natural uranium component. Any DU, if present at all, is in fact less radioactive than the natural uranium in the sample by virtue of its being 'depleted' in the more radioactive isotopes 234U and 235U. As such the radioactivity of the sample is virtually dominated by natural background radioactivity, and any additional component if present adds a negligible additional amount to this. In fact the normal variation in amount of background radioactivity in rocks is far larger than the maximum additional component, if any, of DU in the sample.

Technical aspects of the analysis

For your dust sample, the 4M HNO3 leach dissolved all but the silicate portion of your samples and the ratio of $^{238}U/^{235}U$ was 138.92 with an uncertainty on the measurement of 1.01. The normal value is 137.88. Your measurement with its uncertainty band can be argued to be sufficiently close to the natural value as to conclude that it contains no DU. On the other hand it is slightly elevated and given the isotopic composition of depleted uranium munitions, a value of 138.9 is also consistent with 1% of the uranium in the dust being DU and the rest being natural. When DU makes a contribution to uranium, it also contributes the rare isotope 236U. A 1% DU contribution would result in a 236U/238U value of ~3.0 x 10-7. The value of this quantity we measured in your sample was 5 x 10-7 but with an uncertainty of 5 x 10-7, in other words this measurement is just at our detection limit. While both measurements can be regarded as failing to prove the presence of DU they are also consistent with a 1% DU contribution to the dust uranium which is effectively the lowest contribution we can measure. The concentration of uranium in the dissolved dust material is 0.68 parts per million, which is quite normal for volcanic rocks like those that are common in Hawaii.

Should you have any further questions, please do not hesitate to contact me.

The methodology of the test is similar to that described in the publications entitled :

Parrish, R. R., Arneson, J.Brewer, T., Chenery, S., Lloyd, N., Carpenter, D. 2008. Depleted uranium contamination by inhalation exposure and its detection after >25 years: implications for health assessment. Science of the Total Environment, Science of the Total Environment v. 390, 58-68; doi:10.1016/j.scitotenv.2007.09.044. and

Parrish, RR, Thirlwall, M, Pickford, C, Horstwood, MSA, Gerdes, A., Anderson, J., and Coggan, D., 2006, Determination of 238U/235U, 236U/238U and uranium concentration in urine using SF-ICP-MS and MC-ICP-MS: An interlaboratory comparison. Health Physics v.90 (2), p. 127-138.

Or you can read of the procedure by visiting the method of Laboratory 'B' of the following website: http://www.duob.org.uk/laboratory.htm

Sincerely,

Randall R Parrish

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