



To:  
Ray Fox

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### **Review of Document: Follow up Assessment of 337 Wokingham Rd Earley for Addleshaw Goddard by RWE Nukem dated November 2005**

**6<sup>th</sup> July 2009**

**Prof Dr Chris Busby**

1. I have been asked by Mr Ray Fox, formerly of 337 Wokingham Rd Earley, Reading to comment on the above report which was sent to me by him on 6<sup>th</sup> July 2009.

The report is an account of the radiation and radioactivity measurements made by RWE Nukem arranged by Martyn Wigmore. The survey employed a alpha/beta detector Type DP2 probe survey meter, a low energy Sodium Iodide survey meter, some kind of portable gamma spectra detector and also relied on smear samples of house dust which were analysed at Scientifics, Harwell.

2. I have also carried out surveys at this property and have reported the results elsewhere. Briefly, my surveys (which were made with similar instruments to those employed by Nukem) showed no excessive level of external gamma radiation (above normal natural background) and agreed with the report in that respect. My field gamma spectrometer showed slightly elevated levels of Thorium 232 which were apparently missed by the Nukem survey although the report does not give any results for field gamma. In addition, where Nukem were unable to get down the suspect drain, I was able to enter the drain and also the sewer attached to it for a distance of several metres. I did not find any suspect high levels of alpha or beta radiation in the drain. However, by the time I carried out that survey, Shell had high-pressure water jetted and cleaned the drain some years previously.

I took samples from the area and the results of analyses of these samples showed anomalous levels of various radioisotopes which would have been consistent with the accusations made by Mr Fox that the Shell site had been the location of a nuclear reactor. This was also supported by my analysis of earlier measurements of samples which showed (a) uranium isotope ratios that were from highly enriched uranium from a bomb, a reactor or some experiment and (b) anomalously high levels of plutonium, also indicative of the presence of material from a bomb, a reactor, or an experiment.

3. The conclusions of the Nukem report are not supported by sufficient evidence from their own data or from the Harwell analyses of the filter smears. There never was any suggestion of high levels of gamma radiation on the site and so their measurements of alpha beta and

gamma only confirm what is already known and are misleading in terms of the concerns of Mr Fox and others which have to do with particulate alpha dust and environmental material contamination suggesting the presence of a nuclear reactor or other local source.

4. The key issue is whether or not the house has been contaminated with plutonium and enriched uranium from a reactor, bomb or experiment. These alpha emitters can be inhaled and can cause serious internal contamination and subsequent ill health. The only attempt to deal with this issue by Nukem was to take smear samples using filter papers and have these analysed by gamma spectrometry at Harwell. I point out first that the method is very insensitive since the quantity of dust on the smear paper is very small and one would require high gamma activity to find anything (e.g. from Caesium 137). In addition, the method is not quantitative since the amount of dust on the filter paper is unknown. Second, Plutonium cannot be analysed by gamma spectrometry, and nor normally can Uranium isotopes except in special circumstances. Nevertheless, the results are very interesting and despite the conclusions drawn by Nukem do in fact indicate extraordinarily high levels of uranium in the house dust. This is an important result and should not have been marginalized as it was.

5. The results given for the smear samples are:

Isotope	Bq per sample	Error (2 SD)	My Note
Pb210	<2		
Th234	18	8	Hot decay product U238 and equal to U-238 activity
Ra226	<30		
Pb214	<0.6		
Bi214	<0.8		Radium daughter
U235	1.1	14	Agree with their assumption of no Ra226 so 186keV line is U235. This is because Ra-226 daughters Pb214, Bi-214 not there.
Ac228	<2		
Pb212	<0.3		Radium daughter
Tl208	<0.3		
K40	<7		Normally the biggest line in any natural sample; means that the U238 level is greater than the K-40 level.
Cs137	<0.2		
Co60	<0.09		
Be7	<0.6		
Am241	<0.08		

The results show any competent expert that the level of uranium on the smear is very high and indicate that the uranium is enriched since the activity ratio is 16.3, although the errors are too great to say this for certain. Although there is no information on the quantity of dust on the smear, I have carried out experiments with dust quantities attached to filter paper smears in connection with my work on uranium weapons. Smear samples from house dust gave the total amount on a Whatman filter paper smeared along the surface to produce maximum loading as 112mg. If we take this value as the amount of dust in the Nukem report smear samples, the U-238 level was 1,500,000Bq/kg. The normal level of Uranium in soils in

the area as found by the 1997 Southampton University Ian Croudace Newbury survey is less than 25Bq/kg. Pure U-238 has a specific activity of about 12,400,000Bq/kg. The house dust appears to be seriously contaminated with uranium; indeed it seems to be 20% pure uranium-238

The Nukem report briefly draws attention to this uranium but argues that it could have come from a bathroom tile. The report makes no attempt to quantify the uranium concentration which to any competent expert can be seen to be enormously high merely from its ratio to the other isotopes not detected, particularly Potassium-40.

## **Conclusions**

The Nukem report broadly agreed with earlier surveys with regard to external gamma dose rates which were not above normal background. No adequate attempt was made to further investigate the levels of uranium and its isotope ratios, nor the levels of plutonium in the house and grounds. Re-analysis of the smear sample results by me indicated the presence in the house dust of enormously high quantities of uranium. This result further supports the conclusions of earlier analyses which indicated the presence of anomalous uranium isotope ratios and plutonium in soil and other samples from the location. Nukem are to be seriously criticised for marginalising the extraordinary levels of uranium found in the filter smear sample. It is not possible that this uranium could have, as Nukem coyly suggest, come from the glaze on tiles since these glazes are baked into the surface of the tile and wiping with a piece of filter paper will not remove the uranium (happily for those who use such tiles or uranium glazes). This result makes it more important to look for the alleged reactor or source of the uranium and plutonium found at 337 Wokingham Rd.

Chris Busby  
July 6th 2009