



David J. Rowlands AM

Chair, Petitions Committee

National Assembly for Wales

30th April 2018

Dear Mr Rowlands,

Petition P-05-785: “Suspend Marine Licence 12/45/ML to dump radioactive marine sediments from the Hinkley Point nuclear site into Wales’ coastal waters off Cardiff”

I write regarding your letter to the Cefas Chief Executive, Tom Karsten, dated 19th April 2018 with the purpose of addressing the specific points raised in your letter. I address these in turn:

1. *The petitioner’s suggestion that Gamma spectrometry analysis alone cannot identify all the radioactivity present in sediments;*

The petitioner’s suggestion that Gamma spectrometry analysis alone cannot identify all the radioactivity present in marine sediments is correct. This method does not measure pure alpha- and beta-emitting radionuclides.

However, for radiologically assessing “*de minimis*” (i.e. calculating individual and collective doses that could arise from the disposal of candidate material at sea), the Internationally accepted guidelines (provided by the International Atomic Energy Authority (IAEA)) are used in a tiered approach to assess the risk from dose. As recommended by the IAEA guidelines, Cefas initially undertakes a generic radiological assessment (“first tier”) using the measured gamma-emitting radionuclide concentrations to determine a conservative level of risk from the gamma radionuclides (man-made and natural).

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Conservative estimates are also calculated for alpha-emitting radionuclides ($^{239,240}\text{Pu}$ and ^{241}Pu , calculated from ^{241}Am measured data, and ^{210}Pb calculated from ^{226}Ra measured data) in the “first tier” assessment. Should the level of risk be determined as sufficient to have potential concern, furthermore detailed case specific assessments are undertaken.

Since the generic radiological assessment (first tier) procedure for sediment samples assessed from Hinkley Point indicated that doses received were well below the Internationally recommended limits, a subsequent more detailed case specific assessment was not necessary (including the measurement of alpha- and beta-emitting radionuclides).

In his submission, the petitioner makes reference to “*a more precise and appropriate analytical technique than that used by CEFAS on behalf of EDF*”. It is difficult to comment specifically on this reference in the absence of any detail on the methodology used by the petitioner’s agent, however it is our assumption that the method referred to is the radiochemistry separation method, followed by alpha counting. Cefas routinely uses this methodology (with full UKAS accreditation status) to determine positive values that are well below the levels of detection of americium-241 (by gamma spectrometry). Positive values (by radiochemistry) are required to determine more precise estimates of dose (for example for those used by Cefas in the production of the RIFE report series), rather than those used in generic assessments (which is technically appropriate for dredging applications).

For an initial generic radiological assessment, to determine “*de minimis*”, the limit of detection value is used as the activity concentration to assess the doses due to dumping (as stated in Cefas dredging application reports). The concentration and resultant doses are conservative (i.e. overestimated) in relation to a lower concentration value obtained by radiochemistry. Similarly, conservative estimates for potential major dose contributing alpha-emitting radionuclides ($^{239,240}\text{Pu}$ and ^{241}Pu , from ^{241}Am measured data) are also overestimated in dose calculations, by using concentration values at the limits of detection (obtained by gamma spectrometry).

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- 2. The views expressed by the petitioner, therefore, that “the radiological surveys carried out by CEFAS for EDF have failed to provide a full and complete level of detailed assessment of the totality of man made radioactivity contained within the Hinkley sediment”;**

As described above, and by following the IAEA guidelines, a more detailed radiological assessment to determine “*de minimis*” levels from the measurement of all other (minor) dose contributing man-made and natural radionuclides (alpha- and beta-emitting) was not necessary.

- 3. The views of Friends of the Earth, Barry and Vale that the 2009 samples obtained at depth demonstrate a higher concentration of Uranium-238 and Radium-226 in deeper sediments, and that this finding supports a need for further sampling at depth.**

Concentrations of uranium-238 and radium-226 might appear to be elevated in deeper sediments, in comparison to those at the surface. These elements are both naturally occurring radionuclides. However, in environmental sediments, activity concentrations (both man-made and natural) are known to vary (sometimes by up to orders of magnitude) at depth, and also spatially, due to the heterogeneous nature of sediments.

Concentrations of uranium-238 and radium-226 at depth, from EDF’s sediment data (collected in 2009), were also included in the most recent dose assessment (undertaken in 2018). Furthermore, hypothetically, if the maximum measured values of uranium-238 and radium-226 (at depth) were the only values used to re-run the 2009 assessment again (i.e. no uranium-238 and radium-226 surface data were used) the resultant dose would still be below the “*de minimis*” criteria. This is because the magnitude of activity concentrations is not directly proportional to the estimated dose.

In summary, and as noted in my own verbal testimony to the Petitions Committee in January 2018 together with that of my colleague Dr Kins Leonard, and as reiterated above, the scientific methods used by Cefas to advise NRW on the application to dispose of dredged material at Cardiff Grounds, are

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appropriate, internationally recognised methods. Furthermore, the data derived from these methods suggest the material to be disposed is suitable for disposal at sea offering no cause for concern on either environmental or human health grounds.

I trust this letter provides you and your members with sufficient information for your considerations.

Yours sincerely



David Carlin

Science Director - Cefas

Cc: Tom Karsten (Chief Executive - Cefas), Prof. Stuart Rogers (Chief Scientist - Cefas), Dr Kins Leonard (Principal Scientist Radioecology - Cefas), John Wheadon (Permitting Services Manager, Evidence, Policy and Permitting Directorate - NRW)

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