

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 –

Correspondence from Friends of the Earth, Barry & Vale to Committee, 16.04.18

David J Rowlands AM, Chair, Petitions Committee

Graeme Francis – Committee Clerk SeneddPetitions@assembly.wales

Hearing of 17 April on ‘Petition P-05-785 Suspend Marine License 12/45/ML

Dear Mr Rowlands,

I would offer these comments on NRW response 27 March for information of the Committee, from Friends of the Earth, Barry&Vale. The group formulated a briefing recently, on the basis of our Fol request to NRW for all documents relating to this license application held by them. We are therefore confident that we have viewed most of the background material. We enclose that briefing for use of the Committee too and add the following re. the latest NRW letter to you.

Contrary to NRW we see the Sampling of sediment as not primarily for public reassurance, as stated, but to meet licensing requirements. Sampling at depth, as the Committee requested, is likewise needed to meet licensing requirements: Licence Condition 9.5 requires satisfying NRW that the material is suitable for deposit at the site”.

1. The applicant’s refusal of deep samples is unacceptable. It depends on NRW’s statement “there is no scientific basis for any additional sampling” which is false. The Committee were wrongly told earlier *there is no scientific evidence of higher radioactivity in deeper sediments in the Hinkley Point area.* (as on the NRW website). The evidence is clear in the 2009 data for U238 and Radium, as in the reduced Table below: the numbers show 3 out of the 5 samples were significantly higher at depth (up to 3x for Radium – Ra).

2. No specialist/expert assessment by Welsh authorities

we consulted Public Health Wales and NRW's own internal expert in relation to the dose analysis results. No report is provided (no transparency); this sentence refers only to the radiological dose, not to the chemical constituents.

3. The *de minimis* criteria are for disposal at sea

The IAEA-TECDOC-1375 defines this to include well-mixed near-coastal waters

"The disposal is assumed to take place a few kilometres off the coast so the actual shape of the coastline does not influence the dispersion significantly."

The Severn Estuary site is not "sea", but estuarial water with distinct circulation and ecology the IAEA criterion does not apply.

4. Disposal in the Estuary requires information on dispersal of the radioactivity and use of a habits survey to calculate collective dose. Cefas use a habits survey from the Cumbrian shore for sea-food consumption and beach-combers/recreation. The Severn Estuary is very different and sea-land transfer potentially much stronger.

5. the NRW letter does not cover the chemical contaminants, though they are required to assess their impacts. Their Website says: Chemical contaminants were assessed against Cefas Action Levels^[2] UK guidelines to assess dredged material and its suitability for *disposal to sea*. Several metal and organic contaminants were measured as above Action Level-1, yet no assessment has been made by NRW.

6. CEFAS say *Dredged material with contaminant levels between Action Levels 1 and 2 requires further consideration and testing before a decision can be made.*

The documents show no further assessment – which of course must be against the characteristics of the dump site and conducted under criteria relevant to it. For this European "Special Area of Conservation", criteria from biodiversity/Habitat legislation obviously come in, but none have been considered. The end-fate of the contaminants must also enter, requiring

consideration of the cited studies on deposition on the estuarial mud flats and transfer to marine life and to the land.

7. The Licence conditions 9.5, 9.11 require that the sediments are *suitable for deposit* and that dispersal via *re-suspension should be avoided*. It's not shown how this could be done in practice. Discharge is planned by dropping from the barge, but the only way to ensure "deposit" of the bulk of the material is to discharge via pipe to the sea bottom at tidal extremes and minimising requires cover with heavy material before inter-tidal currents become strong.

9.5. The Licence Holder must ensure that no material is deposited after 4th March 2016 without written confirmation from NRW, acting on behalf of the Licensing Authority, that they are satisfied the material is suitable for deposit at site LU110.

9.11. The Licence Holder must ensure that best practice is used to minimise re-suspension of sediment during these works.

Data for U238 and Radium in 2009 samples taken at depth

3 out of the 5 samples were significantly higher at depth (up to 3x for Radium – Ra). The NRW failure to require deep samples means only the 2009 data are representative of the bulk of the material to be dredged. As there are so few data, the maximum plus a safety factor has to be adopted. This raises CEFAS's 5.8 $\mu\text{Sv}/\text{yr}$ calculated level, potentially to above the 10 $\mu\text{Sv}/\text{yr}$ limit.

Table B.15 Uranium-238 and Radium-226 concentrations for Vibro core samples (also in [1] Appx B) FUGRO survey of five locations in vicinity of intake, outfall and jetty, on 9/11 and 15/11 2009

Sample	U: surface/deep	Ra: surface/deep	depth	Date
1230/1231	48.73 / 46.13	25.25 / 27.65	4.35–4.42m	9/11
1232/1233	43.98 / 71.23	24.46 / 71.25	3.0–3.08m	9/11
1234/1235	39.46 / 41.25	22.43 / 30.30	4.7–4.8m	15/11
1236.1237	30.83 / 50.9	15.56 / 29.10	1.94–2.16m	15/11
1238/1239	50.65 / 68.56	25.29 / 73.57	3.0–4.12m	15/11

Appendix

Assessment of NRW's report on the 2017 Sampling and Analysis of Hinkley Point sediments

This CEFAS Report to NRW [1] suffers from similar defects to the 2013 survey and assessment:

- only surface samples from the top 2cm taken by grab were analysed; these are recent and very mobile sediments that derive from a wide area of Bridgewater Bay [2]. They are not representative of the older and deeper sediments accumulated from higher nuclear discharges in past decades, as are planned to be excavated for laying the new outfall pipes. The previous deep core-samples of 2009 showed significantly higher radioactivity in 3 out of 5 samples (Annex), implying the bulk of excavated material could be higher, giving dose above the *de minimis* limit.
- assessment is described as related to disposal at sea, under IAEA *de minimis* criteria, not for disposal in an estuary. Radioactive dose to the public is assessed only from eating sea-fish, molluscs/crustaceans on the sea-shore, and from recreation on the sea-shore, as in the open coast off Cumbria and Liverpool Bay. It cannot apply to the Severn Estuary.

The methodology used to assess the sediment samples as 'safe' in radiological terms for disposal at sea was from McCubbin and Vivian (2006). This does not include the 2015 IAEA revision to include impacts on wildlife [3]. The individual doses to dredger workers and collective dose to the public are found to be below the *de minimis* criteria. However, the mean dose to dredging workers is higher than previously, but within 40% of the limit, so this verdict cannot be assumed as robust [4]. In calculating collective dose, no sea-to-land transfer is considered, via sea spray or wind-blown dusts from drying coastal and estuarial mudflats, which transfers radioactive elements into local foodstuffs.

The London Convention permitted disposal of artificial radioactive material at sea "*where proper account has been taken of the marine environmental and other conditions*" [5] and meets *de minimis* criteria. IAEA-TECDOC-1375 implements this, defining disposal at sea to include well-mixed near-coastal waters "*The disposal is assumed to take place a few kilometres off the coast so the actual shape of the coastline does not influence the dispersion significantly.*"

The extraordinarily high levels of Tc-99 in Cumbrian lobsters [6] showed a problem with this approach, in that it disregards bio-concentration effects in filter feeders. This problem could occur more strongly in the Severn Estuary, where dilution and dispersal is much less than off Cumbria. While Tc-99 is not involved at Hinkley, radioactive tritium – likewise a beta-emitter and not measured in the current analysis – does show bio-concentration in Severn seaweeds and fish.

The IAEA guidelines updated in 2015 [3] now require assessment of impact on wildlife *per se*, not just for foodstuffs. The Habitats Regs "appropriate assessment" as conducted by Natural England for the whole of the Nuclear project, did not cover disposal of contaminated sediments in the Estuary [7]. As some metals were found to be high in Severn estuary birds [8], it may be that the chemical contaminants would be the most important, many being above Action Level 1. A Habitats Regs assessment is called for as the Cardiff Grounds site is within the Ramsar (wild birds) and *Special Area of Conservation* sites.

Since the radiological *de minimis* criteria do not apply to dumping in the Severn Estuary, where the coastline strongly constrains the dispersion (flushing time of months rather than via twice daily tides), a specific detailed assessment is required for dumping in the Cardiff Grounds disposal site. This has to take into account the reality that it's a *dispersal* site rather than a *disposal* site. Disposal would require discharge by pipe and capping by heavy material (eg. quarry waste). NRW have no assessment of its effectiveness as a disposal site, in the context of the strong Severn tidal currents.

Conclusion – the 2017-8 sampling and analysis do not establish the safety of the deep-dredged material. There is a question on the dose to dredger workers, which might mandate special working practices. Even if cleared for dumping at sea under the *de minimis* criteria, Natural Resources Wales (NRW) are wrong to accept these criteria for dumping in the Severn Estuary. A Habitats Regs 'appropriate assessment' appears required, to cover the uptake of released contaminants by estuarial birds.

----- written by Max Wallis, 10th April 2018

[1] Report on the Cefas BEEMS Technical Report TR444, *HPC intake and outfall location pre-dredge sediment sample analysis results* (Marine Licence 12/45/ML) HPC-DEV024-XX-000-REP-100007, by Dean Foden and Katie Musgrave <http://www.naturalresources.wales/media/684567/cefass-radiological-and-chemical-results-including-dose-analysis-2017.pdf> changed for *NNB GenCo* comments, 2018.

[2] Is the top 2 or 5cm relevant? “the top 5 cm: that would be moving around pretty much on a daily basis” Dr Stephen Roast answered Neil McEvoy at the Senedd hearing. The historic accumulation from Hinkley nuclear discharges would be in the consolidated sediment up to 500cm deep (data in Annex).

[3] Revised Guidelines were issued in 2015, to include environmental as well as human impacts. <http://www.imo.org/en/OurWork/Environment/LCLP/Publications/wag/Documents/2015%20updated%20de%20minimis%20guidelines.pdf> . These specify a specific assessment *where marine environmental exposure pathways to humans and those relevant for marine flora and fauna were either: Not considered by the national radiation protection authority or*

[4] Calculated dose to crew members of 5.8 $\mu\text{Sv}/\text{year}$ compared with the *de minimis* 10 $\mu\text{Sv}/\text{year}$. The calculation is insecure for two reasons:

- dirty working practices may expose some dredging workers to doses above the limit
- the main exposure is from U-238 (also some Th-232), which the limited results indicate could be higher in the deep sediments from historic discharges (Annex); unmeasured nuclides need adding.

[5] “*dumping at sea under the London Convention*” is permitted for (4) radionuclides arising from sources and practices that have been exempted or cleared nationally from radiological control, pursuant to the application of the international criteria for exemption and clearance, where proper account has been taken of the marine environmental and other conditions relevant to potential disposal, re-use and relocation of such materials. IAEA-TECDOC-1375

[6] *A model for the bioaccumulation of (99)Tc in lobsters (Homarus gammarus) from the West Cumbrian coast.* Olsen YS, Vives i Batlle J. *J Environ Radioact.* 2003, 67(3):219-33 <https://www.ncbi.nlm.nih.gov/pubmed/12691720>

[7] CEFAS/S Vince ref. MCU12/58 dated 24 Apr 2013 to NRW/A Cooper, s. 25: a decision for NRW.

[8] Lead in the diet and body tissues of dunlins, *Calidris alpina*, from the Bristol Channel, UK [Peter N. Ferns](#) and [J I Anderson](#), February 1997, *Environmental Pollution* 96(1):35-42 ; same authors and title re. Cadmium, February 1994, *Environmental Pollution* 86(2):225-31. Apte, S.C., Gardner, M.J., Gunn, A.M., Ravenscroft, J.E., Vale, J., 1990a. Trace-Metals in the Severn Estuary - a Reappraisal. *Marine Pollution Bulletin* 21, 393-396

Annex: U-238 data in application to Welsh Government

“*Additional Information of Sediment Quality*” (Appendix G) Sept 2012

It was claimed at the Senedd hearings that the surface sampling of radionuclides is sufficient, as the deep samples do not show significant difference. On the contrary, U and Ra appear higher at depth, agreeing with expectation that the deeper sediments show higher historic discharges. U-238 and Ra-226 are the only significant radionuclides assessed, as Am-241 was below threshold and the Cs-137 was not retained (all deep samples were below threshold for Cs-137).

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Thus 3 out of the 5 samples were significantly higher at depth (up to 3x). U-238 is the main contributor to dose to the dredger crew. The more strongly varying Ra-226 is used to infer other nuclides including Pb-210 with lesser contributions. Only one of these samples appears to come from the outfall area, indicative of most excavated material, so normal science requires further deep sampling. In its absence, a safety factor of 3 might be required, taking the assessed ‘dose’ of 5.8 μSv well over the *de minimis* 10 $\mu\text{Sv}/\text{year}$ limit. Allowance for dirtier working practices than the standard is also needed.