For Immediate Release
8th December 2021

Citizen Science finds spread of man-made radioactivity in Bristol Channel is far more extensive than previously reported.

An independent Citizen Science Radioactivity Survey of the Somerset and South Wales shoreline sediments shows that the spread of man-made radioactivity from reactor discharges to the Bristol Channel is far more extensive and widespread throughout the region's coasts than previously reported.

The survey was undertaken by members of Citizens' Groups from both sides of the Bristol Channel/Severn estuary because EdF, who are dredging hundreds of thousands of tonnes of radioactive mud from the site of the proposed Hinkley C reactors, have repeatedly refused to carry out pre-dumping surveys of the Cardiff Grounds and Portishead sea dump sites where they have disposed of the HPC dredge waste. The survey was carried out in the summer of 2021 prior to the proposed dump at Portishead, but three years after the dump at Cardiff Grounds.

The Citizens' Groups recognised that the lack of such "baseline" research meant that no one had any information on the pre-dump status of radioactivity, or of the post dump impacts of the disposal of such vast quantities of radioactivity, on the South Wales and North Somerset coastal environments or the people living on the adjacent coasts and coastal zones.

Speaking on behalf of the Somerset based Stop Hinkley and Welsh campaigns against the radioactive mud dump Marine Radioactivity Researcher Tim Deere-Jones said:

"*The results of this survey clearly demonstrate that there are serious grounds for concern that the Bristol Channel/Severn estuary coasts and communities had already been subjected to radiological contamination from Hinkley since the 1960s and that EdFs current programme of dumping radioactive wastes at Cardiff Grounds and Portishead should not have been permitted by the Welsh and English Agencies in the absence of the baseline data*."

In Summary the Survey:

- found that shoreline concentrations of 2 radionuclides (Caesium 137 and Americium 241) typical of the effluents from the Hinkley reactors do not decline significantly

with distance from the Hinkley site as Government and Industry surveys had previously reported;

- noted that the presence of both Cs 137 and Am 241are indicators of the presence of Plutonium 239/240 and 241. *(These are all listed as fission products discharged to sea from the Hinkley reactors);*

- found significant concentrations of Hinkley derived radioactivity in samples from all 11 sites (7 along the Somerset coast and 4 in South Wales);

- found unexpectedly high concentrations in sediments from Bristol Docks, the tidal R. Avon, the Portishead shoreline, Burnham-on-Sea and Woodspring Bay;

- found that, along the Welsh coast all samples held significant (10Bq/Kg or more) concentrations of Caesium 137 and positive (i.e: not <less than) concentrations of Americium 241;

- found that the highest concentration of both radionuclides was detected at the most westerly of the Welsh sample sites (Splott Bay: Cardiff), which is also the most distant from the Hinkley point effluent outfalls;

- concluded that the degree of concentration of radioactivity at Splott Bay, implied a possible impact from the 2018 dumping of dredge wastes at the nearby Cardiff Grounds;

- demonstrated that the widely used, official method of analysing samples for only 15 hours was far less precise than analysing samples for 84 hours;

- proved that some of the sediment to be dredged from Bridgwater Bay and dumped at Portishead and Cardiff Grounds held well over twice as much Caesium 137 as the sediments around the dump sites, thus risking a localised increase in radioactivity concentrations as a result of the dumping of dredge waste;

- proved that the, much repeated, EdF PR statement that the material to be dredged and dumped "is typical of sediment found elsewhere in the Bristol Channel" was false and not even aligned with the empirical evidence provided by EdF itself.

Further information and analysis is available in the attached pdf.

Contact

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Annexe

Below, we provide Table 1 results from the Citizens Science project analysis of sediment samples taken from sites increasingly distant from Bridgewater Bay which has been receiving radioactive effluents from the 4 reactors of the Hinkley Point site for over 50 years.

For comparison and discussion, we also provide Table 2 details of Government sponsored annual monitoring of Hinkley sediment radioactivity sediment analysis and additional information on EdFs sponsored analysis of the Bridgwater Bay offshore sediments which were dredged and dumped at Portishead in 2020.

TABLE 1: Campaigners Bristol Channel sediment analyses 2021.

English/Somerset coastal samples

Sample site	**sample type**	**Cs 137 (Bqs/Kg)**	**Am 241 (Bqs/Kg)**
Stolford	mud	9.1	0.53
Steart	mud	5.1	0.38
Combwich	mud	11.0	0.60
Burnham/Brue mouth	mud	12.0	0.50
Woodspring Bay (mouth of R. Banwell)	mud	14.7	0.81
Portishead (Lifeboat st'n)	mud	11.9	0.86
R.Avon (Pill ferry slip)	mud	13.1	1.50
R.Avon/Bristol Central	mud	11.3	0.56

Welsh Bristol Channel coastal samples

Sample site	**sample type**	**Cs137 (Bqs/Kg)**	**Am 241 (Bqs/Kg)**
Sudbrook	mud	10.4	0.49
Goldcliff	mud	10.2	0.72
St Brides lighthouse	mud	11.8	0.70
Splott Bay Cardiff	mud	12.7	1.10

Comment: It is evident that 83% (10 of 12) samples, including those most distant from the Bridgwater Bay/Hinkley Point effluent discharge, hold in excess of 10 Bq/Kg of Cs 137 and in excess of 0.5 Bq/Kg of Am 241. These results are in marked contradiction to those produced by the official 15hour gamma counts, which all imply a steady, and significant decline, with distance from the Hinkley Point discharge points.

It is clear that the 84hour counting time gamma spectrometry commissioned by the Bristol Channel Campaign has generated more precise Cs 137 and Am 241 outcomes than have other gamma spectrometry analyses carried out by Government agencies on behalf of EdF.

It is also clear that the 84hour count has reduced the lower limits of detection for Am 241 and generated "positive" results for Am 241 in all Campaign samples as opposed to the <less than results reported for all RIFE samples in Table 2

TABLE 2: Government/Industry sponsored RIFE sediment sampling (RIFE-26: 2020 latest available data)

Sample site	sample type	Cs137 (Bqs/Kg)	Am 241 (Bqs/Kg)
Pipeline	sediment	50	<1.30
Stolford	sediment	9.3	<1.30
Steart Flats	sediment	7.2	<0.78
River Parrett (estuary)	sediment	14	<0.84
R. Parrett (B'water town)	sediment	7.9	<0.90
Burnham-on-Sea	sediment	0.75	<0.49
Weston-Super-Mare	sediment	2.4	<1.20

Comment:
N.B. We note that the RIFE sediment sample taken from the site named "pipeline" is remarkably high compared to recent years data: not since 1997 has Cs 137 concentration in sediments from the near Hinkley samples exceeded 50 Bqs/Kg.

RIFE -26 has failed to discuss this analytical outcome and makes no attempt to offer an explanation for the very large year on year increase from around the upper "teens" which has been the norm for the last decade. However RIFE-26 does report that HPB suspended power generation in June 2020 to undertake "extensive inspections and maintenance operations". It would be interesting to know when this sample was taken (before or after the suspension of power generation).

However, The RIFE sediment analysis results for 2020 are mostly representative of RIFE work over recent years. Only 2 of the 7 samples (43%) analysed by RIFE in 2020 had Cs 137 concentrations of 10 Bq/Kg or above. All of the samples were recorded as having < less than concentrations of Am 241.

Compared to the results of the Citizens Science sample analyses (Table 1) the RIFE results are anomalously low. We propose that this is a function of 2 flawed aspects of the official sampling and analytical methodology:

1: The short "counting time" (15 hours) of the RIFE agreed gamma spectrometry methodology which, according, to a number of peer reviewed academic reports, does not produce the most precise or accurate radiological data.

It is clear that the Table 1 longer "count times" provide notably lower Am 241 <less thans than the Table 2 outcomes. When the shorter count-time methodology has been used, there are no "positive" results for Am 241, and the overall outcome has provided no useable or representative data for that nuclide. We note that many observers treat such outcomes as implying negative/nil Am 241 concentrations in the samples thus described.

Similarly, the RIFE Report's low (and declining with distance from the HPC site) reported concentration of Cs 137 may also be attributed to the short count time. In that context, it is possible that the RIFE maximum Cs 137 results would be higher, had a longer "count time" been used.

We conclude that it is evident that the analytical methodology used by Government Agencies to produce RIFE radiological data over many decades has provided the public with incomplete and inaccurate data.

2: The RIFE reports provide only the descriptor "sediment" of the samples. In marine science terminology "sediment" is a broad term used to define "natural unconsolidated granular material with sediment density greater than water". This term thus includes anything from very fine silt/mud material through to pebbles and cobbles. There is a very broad scientific consensus that higher concentrations of these radionuclides are closely associated with the increased presence of fine particles, while lower concentrations are found in association with coarser particles.

Our review of technical data on the sedimentology of the Inner Bristol Channel and Outer Severn estuary confirm that the vast majority of the regional inter-tidal zone is composed of fine sediments and that these are therefore most representative of the sediments likely to hold highest concentrations of man-made radioactivity. We propose that the low (and declining with distance from HP) concentrations of Cs137 and Am 241 recorded by RIFE may be a function of poor choice of sediment sampling sites and that sites chosen for RIFE sampling produce mixed grain size sediments (added sand shingle etc) rather that high % of fine sediment "mud" or "silt"

In this context it is postulated that the lower Cs 137 concentrations reported by the RIFE (Table 2) report are a function of the presence of coarser sediments in the samples which are poorly described and do not consist of only the finer sediments. We conclude that RIFE reporting is indicative of poor methodology and does not provide either an accurate, or a conservative description/quantification of the radiological status of regional and dump-site adjacent sediments.

We note that the RIFE Report's sample analytical outcome for Cs 137 at Burnham (0.75 Bqs/Kg) in a sample, described imprecisely as "sediment, is also clearly anomalous in comparison to our Citizens Science Cs 137 outcome for its Burnham sample (12 Bq/Kg), precisely described as mud. This represents a percentage increase of 1,500%.

We conclude that the official RIFE methodology is a further example of a combination of poor site (larger sediments) and short count times.

We conclude that it is evident that the analytical methodology used by Government Agencies to produce RIFE radiological data over many decades has provided the public with incomplete and inaccurate data and left coastal zone communities in ignorance of the long term radiological exposures from contact, diet and inhalation doses they have been receiving from marine radioactivity.

3: We further note that the shoreline "surface" (0 to 5cm deep) sediment sample outcomes of the RIFE and the Campaign surveys are both dis-similar from the outcome of EdFs 2020 radiological analysis of Bridgwater Bay sediment cores from the Cooling water intake and Effluent outfall areas where dredging is necessary. In summary, EdFs 2020 data on the gamma analysis of 23 deep core (o to 5.6 metre) samples of Bridgwater Bay sediment from the dredge area, presented by CEFAS on behalf of EdF, shows the following:

Cs 137 concentrations in the *surface to 0-5 metre subsamples* of 15 sediment cores (65% of 23) exceeded 10 Bqs/Kg,
Cs 137 concentrations in the *surface to 0-5 metre subsamples* of 12 sediment cores (52%) exceeded 15 Bqs/Kg,
Cs 137 concentrations in the *surface to 0-5 metre subsamples* of 10 sediment cores (43%) exceeded 20 Bqs/Kg,
Cs 137 concentrations in the *surface to 0-5 metre subsamples* of 8 sediment cores (35%) exceeded 25 Bqs/Kg,
Cs 137 concentrations in the *surface to 0-5 metre subsamples* of 4 sediment cores (17 %) exceeded 30 Bqs/Kg,
These sample sets were from both the "outfall" and "intake" dredge sites. The maximum Cs 137 conc' recorded was 34.8 Bq/Kg.
REF: "TR533 and TR534 Radiological Assessment of Dredging Application for HINKLEY POINT C (2020)." CEFAS: Part 1 and Part 2.

It is clear from the above that the samples referenced hold two to three times more Caesium 137 than the shorelines samples tabulated in Table 1 and Table 2.

It is also clear from the above that the, much repeated, EdF claim (made in respect of dredge sediment disposal at Portishead) that "The sediment is typical of sediment found elsewhere in the Bristol Channel" is deeply inaccurate, based on an un-evidenced EdF assumption and not even aligned withS the empirical evidence provided by EdF itself.

We conclude that the EdF commentary is inaccurate and based on a total lack of Bristol Channel wide data. We conclude that the EdF statement should NOT have been made as it is clearly yet another major mis-representation of the true radiological status of Bristol Channel/ Severn estuary environments distant from Hinkley Point

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